

National Aquatic Animal Health Task Force on Aquaculture Mollusk Disease Program Standards Workshop, Work Group 7

March 16-17, 2005. Seattle, Washington

1. Welcome and introductions by meeting organizers (Amos, Blair, and Rolland)

Participants: Kevin Amos (NOAA Fisheries), Jill Rolland (APHIS), Guppy Blair (Fish and Wildlife Service), Steve Ellis (APHIS), Bill Dewey (Taylor Shellfish), Marcia House (NW Indian Fisheries Commission), Gene Bureson (VIMS), Ralph Elston (AquaTechnics), Don Hoenig (AVMA), Fred Kern (NOAA/NOS), Russell Rogers (WA Dept. of Fish and Wildlife), Ed Rhodes (East Coast Shellfish Growers).

2. Overview & process for developing National Aquatic Animal Health Plan (NAAHP) (PPT presentation by Amos)

Questions: Will the NAAHP supercede state regulations? No, it may provide some models for entities to consider. Primarily, it is a guidance document for the Federal agencies.

Will the NAAHP have a risk analysis component? Yes, it is likely that a recommendation will be made for risk analyses for some aquatic animal diseases.

Is current surveillance adequate for states to regulate and manage aquatic diseases?

Recognizing it is within the purview of states to determine which diseases they choose to regulate, it is likely that some states have adequate surveillance while others do not.

3. Review charges of WG 7 and approve agenda - Rolland

4. Review of Spring Viremia of Carp, Infectious Salmon Anemia programs – Rolland, Ellis

- Started as emergency eradication programs because they were considered foreign animal diseases.
- Declaration of emergency by Secretary of USDA
- Attempt to eradicate infected stocks
- FWS conducting wild fish survey for SVC, esp. in Mississippi River drainage
- SVC found in WA in backyard hobbyist koi pond; in Koi in Missouri
- CCC (Commodity Credit Corporation) funds to pay for indemnification
- APHIS may move to control program from eradication program (endemic vs. exotic disease management)
- What is the status of original SVC sites? De-populated, disinfected, and re-populated with SVC-free stocks
- Are there SVC import protocols? Work in progress by APHIS.
- For details on APHIS' ISA program summary/emergency response (on APHIS aquaculture web page), see Work Group 4 (salmonids) report
- USAHA and AVMA important for lobbying APHIS for response to disease issues
- Fallow and bay mgt. plans implemented in Maine
- Will there be indemnity beyond the two year original ISA plan? Possible – a request for an extension is in the process of consideration.
- Regional cooperation is essential in disease control efforts.

March 16, Afternoon

5. Mollusk Diseases of Concern

-Reportable aquatic animal diseases (RAADs), Program aquatic animal diseases (PAADs), descriptions, criteria

- OIE proposals for de-listings as proposed by Aquatic Animal Health Standards Commission

Marteilioides chungmuensis possible proposal for listing through APHIS to OIE starting with a resolution to the US Animal Health Association in November, 2005. A similar resolution was received with interest in November 2004 but not endorsed by the Aquaculture Subcommittee of the USAHA because more surveillance documentation was needed. It was agreed that there was not enough time before April 1 comments due to OIE by APHIS to prepare the surveillance documentation. . In addition to surveillance that shows a lack of disease in North America, we need to establish the known fact that susceptible populations exist. Refer to data from West coast surveillance where it is not found. Disease causes serious morbidity and makes product unfit for marketing. More likely that data could be gathered by November, 2005 for OIE request.

Mikrocytos mackini proposed delisting due to it not being a serious problem in most climates, and therefore, not a large population of oysters at risk to disease. Only a disease problem in oysters in very cold (approximately 10° C or less) water. *C. gigas* and *O. edulis* are susceptible. Possible problems in confusing *Bonamia* with *M. mackini*. Canada planning to keep *M. mackini* on their list; U.S. may want to also. We may need to prove exports to Canada are free but both diseases occur on the Pacific coast of Canada while the Atlantic coast of Canada may be free of both. A regional control program may be sufficient. US does not want to spread *M. mackini* to the Atlantic or Gulf coasts. Mikrocytosis has only been found in *O. edulis* stocks in British Columbia that were exposed experimentally. In the winters of 2004 and 2005, a site on the West coast of Vancouver Island did have an episode of clinically visible mikrocytosis. The disease is a problem in colder water temps. The shellfish aquaculture industry and state authority is dealing with mikrocytosis on regional level in WA State. Other states could still regulate to keep the disease out (and are doing so on the Pacific coast), with a surveillance program to show the disease doesn't exist in product moved from state to state.

Haplosporidium nelsoni is only a problem for *C. virginica*. *C. gigas* can carry pathogen, but does not cause a disease problem. The causative agent is temperature limited and most likely cannot survive in Gulf of Mexico (Gulf) region. The disease has already been spread across many areas of the Northern Hemisphere. No large populations at risk. Gulf areas may want to have local surveillance and a local program. Gulf region does not want to take risk of introduction. Disease introduction is primarily of regional significance for the Gulf but the distribution on the Pacific coast of North America is not known in detail although it is found periodically on the Pacific coast. The disease, known as "MSX" is wide spread from the mid-Atlantic States to

New England and was recently found in Nova Scotia. Some pockets of disease-free areas may exist in the Northeast U.S. .

Perkinsus olseni not found anywhere in U.S. but widely distributed throughout the world, with susceptible oyster populations in the U.S. We would want the disease caused by this parasite designated as a national program disease. The disease probably originated from Korea and the agent is considered synonymous with *P. atlanticus*. In addition to the absence of this disease in North America, it is not known to occur on the Pacific coast of South America. A forthcoming paper in *Disease of Aquatic Organisms* reports *P. olseni* in Argentina.

U.S. does not have diseases caused by the following pathogens: *Marteila chungmuensis*, *Marteila refringens*, *Bonamis exitiosus*, *Marteila sydneyi*, or *Perkinsus olseni*. It was suggested that the U.S. have national control programs for these diseases.

Some of the listed diseases can have multiple shellfish hosts. It is believed that some of these disease agents can also be spread in ballast water (as hitchhikers on susceptible organisms) from endemic countries.

QPX disease of eastern hard clams, *Mercenaria mercenaria* is not known to occur on West coast. *Perkinsus marinus* is present on the Atlantic coast of the U.S. but not on the West coast.

Perkinsus chesapeaki may also need to be added to the list of RAADs. The disease is found in Chesapeake Bay, but not seen anywhere else even in susceptible species. There has been limited culture of hosts in the known affected area. *Mya arenaia* and *Macoma* spp. clams are susceptible. Affected clams may be harvested and moved for culture purposes. May want to regulate domestically for resource protection and to control spread of the disease. This parasite does cause significant mortality in its known hosts.

Haplosporidium nelsoni (MSX), and *H. costale* (SSO) should be given consideration on U.S. RAAD list because they are not found in Gulf region.

All shellfish diseases on page 5 of draft Chapter 4 of the NAAHP either do not exist, or have a limited distribution in US. It was suggested that all be given consideration as national program diseases.

We may wish to consider another criteria for listing as program disease - high risk that vectors cause movement of disease.

If an exporting country has a PAAD, is it possible that the U.S. may not want any product from that country – live or processed product? In Washington State, it is unlawful to stock/release live shellfish from outside of the North American Pacific coast into state waters. Regardless of concerns, disease control regulations need to be based on science. In Virginia, introductions are allowed on case-by-case basis. Hard clams from Virginia were shipped to Hawaii and co-cultured with shrimp. A producer wanted to bring back the

“exported” clams to Virginia. Virginia decided to not allow re-entry of clams due their co-culture with shrimp and the possibility of “hitch hiker” potential or disease causing agents from the shrimp that might be carried by the clams, in spite of the fact the clams were certified to be “disease-free”. Virginia has a very lucrative clam production business. Clam seed is needed early in the production season and could be supplied early from production sites in Hawaii.

There is a need for standardization of surveillance and diagnostic tests. We need testing programs that we (farmers/regulators) have confidence in. If the U.S. does not trust a competent authority in another country, it can send a team to conduct testing and/or evaluate the country’s competence. If a country that exports to the U.S. has adequate infrastructure, laboratories, etc. additional testing by US should not be necessary. Current OIE testing protocols may not be adequate. Consideration is now being given to revision of the OIE diagnostic manual.

Texas does not accept live oysters from Washington as they do not want to introduce a new species of shellfish.

A two-year history (in past treaties) of disease testing has been helpful to find diseases in shellfish from other countries. Once MSX (causative agent *Haplosporidium nelsoni*) was found in Korea, U.S. disallowed fresh oysters imported from Korea. *P. olseni* found more recently in live oysters from Korea. Also found MSX in samples from Japan. MSX is also found in juvenile *C. gigas*.

Can the processed shellfish product be safe to import even if infected with disease? Freezing product can be sufficient for reducing/eliminating the risk from some diseases. Not enough data in some situations to evaluate if freezing is sufficient to eliminate risk.

The unknown diseases, the ones we don’t look for, may pose the greatest danger. If targeted surveillance is conducted over at least a two year period, we increase the likelihood of finding a disease. The group discussed how one reports findings of diseases that are not listed. If none found, simply note that “No other significant findings” on certificate. Some thought that all diseases should be reported, even if not a RAAD. This approach is not consistent with other aquatics or terrestrials. Possibly, findings of any species of *Bonamia* or *Perkinsus* should be reported. When a type of shellfish herpes virus was first found, it was reported to be devastating in France and New Zealand. Some said it was ubiquitous, and it is now is showing up globally, but is limited in distribution within regions, such as in the United States where it has been found only in two bays in California, despite a national surveillance program. The herpes virus does not seem to impact wild or adult shellfish. It has never been detected in shellfish hatcheries in the US.

There is a good rationale to continue to exclude diseases exotic to U.S., even if de-listed by OIE such as the disease caused by *M. sydneyi*. Would diseases such as *M. sydneyi* be detected and reported if not on OIE list? Since susceptibility of U.S. species is not known, we should continue to exclude from the country.

B. ostreae is in the U.S. and is reportable to OIE. Should we leave it to be managed regionally? Although it occurs in Washington, California and Maine, and possibly other states, it should not necessarily be considered widespread in the US, so perhaps we should leave on the RAAD list.

M. roughleyi, is now called *Bonamia roughleyi*. *Bonamia exitiosa*, not exitiosus. *Marteilioides chungmuensis* (spelling change from list). *B. roughleyi* keep on list. *Xenohaliotis californiensis* keep on list. Have only in abalone in California. *H. nelsoni* and *costale* keep on list. *P. marinus* keep, not present on West coast. Keep QPX, add *P. chesapeakei*. Herpes virus Oyster OSV-1 two strains found. Limited distribution in US. Have to specifically look for by PCR method, because it is not see on routine testing, unless it has occurred in larvae examined by histology. While the disease is potentially significant, not enough known at this time to determine its significance. Possibly it is an emerging disease, but we do not know enough about it to list it. So far, it is only well documented as a problem in hatcheries.

Brown Ring Disease also has been reported, and is well documented in Europe in Manila clams. It is very specifically linked to *Vibrio tapetis* bacteria. Clinical signs allow a strong presumptive diagnosis. This disease has not been seen in the US. It causes mortality and is economically significant and should be added to the list, as well as recommended for OIE listing.

"Juvenile oyster disease " (JOD) is a syndrome of morbidity and mortality of nursery reared Eastern oysters. It is considered manageable and there is no definitive identified infectious agent. The syndrome occurs in New York and elsewhere and there appears to be no need to include it in a national plan at this time. Malpec Bay Disease was discussed and consideration was given to listing it as a RAAD.

6. Zonation

Where do the program diseases identified occur? Does the zonation approach work for mollusk diseases? Are there North America zones or US zones that make sense?

We need to consider zoning disease-by-disease. We could also zone by susceptible host. Isn't the purpose of zoning to avoid lot certification? Zone is established by initial surveillance that can be reduced over time and also once the zone is established we can prevent product of a lower health status from entering the zone.

The burden of proof for disease-free status is on the U.S. and creating/maintaining zones through surveillance. An issue that will need to be addressed is whether or not we have sufficient surveillance/disease data to establish zones and, if not, the costs of required surveillance will have to be determined and funded.

A good start may be looking at what we know we have and where. What are the major diseases of concern in the U.S. and where do they occur?

Bonamia exitiosa: Does not occur in the U.S. It's an exotic. Disease-free zone is the entire U.S.

Bonamia ostreae: Known to occur in Washington, California and Maine. Oregon does not culture *O. edulis* (the susceptible oyster species). Occurs in Canada (just found in British Columbia).

Marteilia refringens: Exotic (known from Europe). Entire U.S. is free. U.S. has susceptible species (*O. edulis*).

Marteilia sydneyi: Exotic (known from Australia). Sydney rock oyster is susceptible species. US does not have this species, but we don't know susceptibility of the species present in the US. Entire U.S. is free.

Marteilioides chungmuensis: Exotic (known from Korea and Japan. Entire U.S. is free. *C. gigas* is the susceptible species in U.S.

Bonamia roughleyi: Exotic (known from Australia). Entire U.S. is free. Sydney rock oyster is susceptible species – US does not have this species, but we don't know the susceptibility of the species present in the U.S.

Mikrocytos mackini: Known to occur in Washington and Canada (British Columbia). *C. gigas* and Olympia oysters (*Ostrea conchaphila*). This would not be in the national program. It would be managed regionally.

Perkinsus olseni: World wide except in North or South America. Numerous susceptible hosts are found world-wide. Entire U.S. (Americas) are disease-free zones. We know our Manila clams are susceptible.

Xenohaliotis californiensis: In abalone in California. No Atlantic coast abalone populations. Abalone in Mexico are affected.

Haplosporidium nelsoni: Found in *C. virginica* on the Atlantic coast, *C. gigas* on the Pacific coast, but not found in the Gulf Coast, where susceptible *C. virginica* are native. Also found in Nova Scotia. France, Korea and Japan have this in *C. gigas* (endemic).

Haplosporidium costale: Found in *C. virginica* on the East coast, extremely rarely on the West coast, but not found in the Gulf coast. Found in limited areas in Nova Scotia and Prince Edward Island (Canada).

Perkinsus marinus: Gulf coast in *C. virginica* and East coast. *C. gigas* can be experimentally infected (susceptible host on West Coast). Never found on West coast. Report of positive *C. virginica* oysters in Pearl Harbor, Hawaii from 1970s but status of population is unknown and also detected in *C. virginica* in the 80s (relic populations). Only in Pearl Harbor (Oahu).

QPX: Hard clams (*Mercenaria mercenaria*) on the East coast from Virginia to Nova Scotia. Clams south of Virginia are highly susceptible, so Virginia outlawed use of seed stocks from south of Virginia.

Perkinsus chesapeaki: Found in clam species *Mya arenaria* and *Macoma balthica*, *Tagelus plebius* (stout razor clams) from Chesapeake Bay. *Mya* and *Macoma* hosts occur on Pacific coast (susceptible species). Disease never observed on the Pacific coast.

Brown ring disease: Does not occur in the U.S. The Manila clam is the susceptible species. Found in France, Spain and Portugal and may be more widespread in Europe. Causative agent is *Vibrio tapetis*.

How much is commerce now restricted within these zones? Is there an issue on movements? What about movements of ornamental clams? Ornamental shellfish are a non-issue.

Cape Hatteras separates East coast zone from Gulf zone. Hawaii is essentially free of the diseases.

What is status of shellfish aquaculture in Alaska? Alaska is attempting to stimulate the shellfish aquaculture industry, but no diseases known at this point to occur there. They culture oysters, abalone, and native geoducks and some other native clams. Alaska allows *C. gigas* seed to enter the State. All *C. gigas* stock is cultured. They have a tribal corporation hatchery for native clam and Pacific oyster seed production and a geoduck industry is starting up.

Is there cross-zone movement? There used to be movements of live shellfish between Maine and California. North of Cape Hatteras (Virginia) sends seed to South Carolina and then back again to Virginia for further grow out.

The majority of seed and shell stock products are moved within the broad geographic zones where they originate but there are exceptions and there has been increasing interest in supplying seed from one broad geographic zone to another.

Gulf coast is primarily wild shellfish production - very little hatchery production (oysters). More hatchery production of oysters as you move up the East coast. Clams – Eastern seaboard is heavily hatchery-produced.

Gulf-public beds are used for product to market and seed. Lease sites for planting seed, producing market-sized product.

Are there restrictions based on animal health on product destined for human consumption? The National Shellfish Sanitation Program (NSSP) does not consider animal health. Apparently, only the Korean situation is an example where a bi-lateral agreement prevented the introduction of live product based on animal health concern (MSX). Initially based on a treaty, that has been turned into an MOU. Chilean oysters were shipping to the US, but

stopped due to costs. Live scallops are coming into the US from Chile. Live product is a potential risk factor (vector). Risk is considered low because it is destined for human consumption. The risk would be if the product intended for human consumption ended up on someone's beach.

Closed re-circulating systems are required for imported live shellfish destined for human consumption. This containment reduces/eliminates animal health risks. Doesn't preclude a customer from buying the product from a re-circulating system and placing product on the beach (still considered low risk). The NSSP has been the vehicle to stop product from coming in as a live or fresh, shucked product in the absence of a NAAHP. For high-risk diseases, perhaps we would want to control import of product for human consumption based on animal health risks (product processed in the US). We would have to apply these control measures for commerce within the US as well in order to be consistent with WTO/OIE protocols.

At this time, it is difficult/impossible to import live product that is competitively priced with domestic production and free of disease concerns

END DAY 1

DAY 2, St. Patrick's Day

7. Surveillance

High Health Program: Companies exporting live product are using an APHIS-endorsed health certificate are under this program which is a voluntary program of the Pacific coast Shellfish Growers Association but can be adapted for use by any regional producers in the nation. Surveillance involves a once a year inspection of broodstock. Historic sampling for some facilities goes back 20 years. The once-a-year inspection consists of a 150 animal sample (per OIE). Hatcheries would also have once a year certification for seed stocks. Lot sampling for export also occurs. Assuming lab report shows no known pathogens of significance, the health certificate goes to the APHIS area veterinarian in charge (AVIC) for endorsement. In addition, the exporting facilities are required to have an adequate program of records documentation, an established relationship with a veterinary practitioner to verify that no unusual mortalities have occurred, or report such events if they do occur, and to verify that no chemical treatments for animal disease have been used for a specified period prior to shipment. Exact export requirements depend on the importing country.

Sampling is both for the reportable diseases and other significant pathogens (*Marteilioides chungmuensis* and any species of *Perkinsus*).

Different States have various surveillance programs. Washington has a state-funded program for feral and cultured populations of shellfish.

Export companies have strong surveillance programs. Companies that produce seed stock for inter-state movement have lot certificate (usually 60 animals) of the seed stock for OIE-listed diseases. For Washington State companies, the surveillance requirement can be

waived by the State to once very three years if disease status has remained the same and no new animals have been introduced.

How are animals chosen for use in surveillance (i.e. moribund animals)? APHIS-related sampling has to be done by an APHIS-accredited veterinarian, an APHIS employee or a recognized state or federal health official. For other inspections, there is no requirement for who collects the sample. In contrast to finfish culture, moribund animals in shellfish culture are less obvious and less likely to be detected by routine or casual inspection of the shellfish. Unusual mortality has to be reported and investigated per OIE protocols in order for a farm to receive certification from APHIS.

The animals are randomly collected . For shipments to British Columbia, Canada. (like shipping to another State in this case), the farmer may be collecting the samples themselves.

Targeted surveillance for APHIS certificates is oriented towards adult oysters, but for States, they may have other requirements (testing seed, if that's the commodity being sent). Targeted surveillance is not being conducted on a regular basis in all the production beds. If we need to ramp up surveillance of all production beds, it would be costly to the industry.

What is the purpose of the surveillance? To look at the high-risk product (seed and broodstock as production stock is for human consumption) to both meet the disease-free expectations of the receiver and to protect industry from introduction of new pathogens. To date, the current level of targeted surveillance is considered adequate (as per west coast surveillance programs). Is there a history of the shipped live product meeting the disease-free expectations of the recipients? Yes.

Recent finding of *Bonamia* in British Columbia is not surprising due to finding in Washington State more than 20 years ago and the importation of flat oysters from Washington to BC on many occasions after the discovery of the disease in Washington State. B.C.'s brood stock originated from Washington stock. The OIE detection method is not sensitive for seed or juveniles and it is possible seed stock from WA may have been certified and sent to BC and may not have actually been free due to weaknesses in the detection method, although producers were warned in certification reports about the insensitivity of using histology for examining seed for *Bonamia* and were advised to have brood stock examined. Sales to BC continued after such warnings and, indeed, after the confirmation of *Bonamia* in brood stock of certain Washington producers that sold seed, under permit, to growers in BC. Nonetheless, the introduction to BC may affect future trade between WA and BC.

East coast: No routine targeted surveillance for hard clam *Mercenaria mercenaria*. Monitoring of wild stocks was being done to determine distribution of QPX. Industry wants to know what they have in terms of shellfish diseases in wild stocks but is not interested in having the information shared. This data was collected mainly for marketable clams for human consumption-marketability issue. There is certification of lots for animals

being moved for over-wintering. Other than over-wintering, there isn't known shipping of live animals for relaying, only for human consumption. No targeted broodstock surveillance occurs in the East coast region for hard clams.

If you notify a State of an import (from another State), then there is a certification requirement. If the seed is going in the water, they should have a permit, but sometimes imports are made without the permits.

Growers want to see equity between States, so that what is imposed on one grower is imposed on all growers in all States. This harmonization has occurred from a human health standpoint via the Interstate Shellfish Sanitation Conference (ISSC), but not from an animal health standpoint! Three legs of the ISSC: industry, States, FDA. If you are not a member of the ISSC, you cannot ship product interstate unless your State allows otherwise. The ISSC may be a model for how to implement a NAAHP for animal health for mollusks, although a national regulatory program for animal health is not what is being asked for.

Routine surveillance of wild oyster producing beds is done yearly for MSX and dermo (*Haplosporidium nelsoni* and *Perkinsus marinus*) in the Chesapeake Bay by both Virginia and Maryland. Information is used to control movements within the bay. It's a huge effort every year. Maryland looks at 70 areas annually.

8. Disease prevention

East coast situation is not harmonized between States as some have strict requirements for movement (both inter and intra state) and others have no requirements or requirements that are not enforced. Sampling for movement may involve looking at 25-60 animals. There is a lack of consistency between numbers of animals sampled. Methods are probably uniform (histology).

What about sampling at processing? Many of the diseases do not have consistent signs such as lesions. They may just appear watery and that could be due to a variety of reasons. One of the recommendations from the Denman Island Disease Workshop (Tacoma, Washington October 2004) was to train oyster shuckers to recognize unusual looking oysters to be separated out for testing.

Sixty animals is the presumptive level to detect 5% prevalence of disease with 95% level of confidence, as identified by the AFS bluebook. This is why this level has been chosen by the West coast growers. West coast has five states, allowing for easier harmonization than among the more numerous East coast States.

Tribes are like separate countries and could choose to import whatever they want. For finfish, in Washington State, treaty Tribes are signatories to the Co-managers finfish disease control policy. Currently, there is no such agreement with Tribes for shellfish. The Lummi Tribe has an agreement with Washington State as well as other States relating to exports, but none of the other Washington State tribes do at this point, although the Lummi Nation is the only Tribe in Washington that operates a shellfish hatchery and nursery. The

Tribes have entered into an agreement with the Washington Dept. of Health on the human health side and abide by ISSC in this manner.

For certification purposes, Virginia and Maryland also use 60 animals. In some cases, Maryland looks at more. However, in some diseases, you may need to look at a different number of animals. For example, are you willing to risk a 60 animal sample to bring something into the US that could result in introducing a disease like *P. olsenii*? You need to look at the impact that an introduction of a pathogen may have. Can you legally impose greater restrictions to avoid introduction of a disease you really don't want (Foot and Mouth Disease, for example)? Higher risk introductions can have other thresholds to meet, such as defined disease free history with documentation. In addition, exotic diseases not now listed by OIE can be petitioned for listing or the U.S. can substantiate a case for excluding shellfish from areas in which such exotics, with known deleterious effects, can be excluded.

Could there be maximal protection for West coast to avoid *Perkinsus olsenii* and *Marteilioides chungmuensis* being introduced? In those extreme cases, we may not only want limitations for live product but also product for human consumption.

Good guidance provided through ICES introduction guidelines. Guidelines were developed to bring in Pacific oyster seed from Japan in WA. They were very restrictive, including a quarantine. This was for genetic stock.

If we put in place insurmountable restrictions on imports for animal health reasons, we must ensure they are based on sound science to ensure that measures are not imposed on us that are for marketing reasons and not scientific ones.

Are we confident about the competent authorities' ability to certify health? Washington's experience is that some countries would certify exports without proper investigations. Maryland solved such an issue by being allowed to do their own sampling – they would split samples where the foreign country would be looking at the same sample that Maryland would be testing. The U.S. can audit other countries to review their competent authorities. A national program could help in creating consistency in international imports.

What is the economic value of export of domestically produced mollusks? Information is available, but accuracy may be questionable.

Ballast water – It is possible MSX was introduced via ballast water. Ballast water is an issue that a NAAHP probably wouldn't address. However, this is linked to invasive species issues and other programs being developed by other groups. Ballast water doesn't only introduce animals, also pathogens. Fouling on ship hulls is also an issue for potential disease vectors. There are regulations about where the ships are cleaned, but it may also be worthwhile to look into the risk of disease introduction via the ballast water and organisms growing on hulls. WWII ships from the Chesapeake are being moved to England for destruction. The ships have fouling and are located in a high *H. nesoni* and *Perkinsus marinus* area-may be a risk to England shellfish. Is there a risk assessment on disease

introduction from hulls/ballast water? Australia and New Zealand may have something for ballast issues as they have strict restrictions in place. The restrictions are mostly based on concern for exotic algae introductions.

Interstate certificates: Are changes needed? Issue of certifying officials and requirements – topic of another working group. Approval of lab personnel, etc. Many States require an approved shellfish pathologists, but there is no method for approval. This is a lack in infrastructure that also must be addressed by the NAAHP. Also ring testing, etc.

The model health certificate could be considered a model template for an import certificate to the US as well. The export certificate is simply a model for when an importing country has no standards for its health certification requirements, but wants some regulations in place. This could circumvent more restrictive requirements by supplying them with a model certificate. This certificate would not supersede existing health certificates that countries provide to us.

Certificate does not include how many animals were tested, but often a lab report may be requested to accompany the certificate and could include number of animals tested and methods used to test.

Question asked about reporting the finding of a foreign organism in shellfish during an exam where the organism did not appear to be causing disease in the host. It would only be an emerging disease if there were lesions or mortalities. We don't know what a finding of an organism would mean if it's not associated with clinical findings. Statement on health certificate could potentially be added... "in addition to the diseases listed, on day of inspection there was no evidence of other infectious agents".

An import template may have our PAAD list whereas an export template would have the OIE list, unless through surveillance we've established that we are free and have a control program that allows us to detect the disease. Therefore, at some point, you may not have to actually test for a disease as long as surveillance would allow us to detect the disease should it arise. An example is foot and mouth disease. We do not test for it because we've been free for so long, but there is an expectation that we would detect Foot and Mouth Disease should it arise.

West coast interstate transfers are also important; need for guidelines especially for new diseases. Need local control, within States, along with import control. Sanitation practices needed for hitchhikers. Chlorine dip treatment used in Washington when feasible for transfers. Virginia requires for clam seed from Hawaii to be dipped. Efficacy documented? No, but appears to be effective. Washington conducting research study this year for mussels to determine efficacy of sanitation measures. When seed is cleaned routinely, the burden of fouling organisms or hitchhikers can be kept very low and disinfection may not be necessary. Some areas may be more prone to collect fouling organisms. East coast seed usually comes from a hatchery and therefore has less chance of attached organisms. Larval production methods are improved presently compared to historical production. Could recommend Best Management Practices (BMPs) for countries still developing better methods of cultivation.

Health certificate and transfer permit needed on East coast. May differ depending on the State if one or two documents needed. State of Washington used cover letter as import permit with conditions required. May request several documents for import, keep in file, not with transfer permit. Is commerce impeded without scientific basis by States that has caused problems? It has been a problem in the past. If no uniform national program, a State may take a position not based on science. For a grower in Maine, some Massachusetts requirements may be problematic. Safe commodity concept (new for OIE) such as frozen product, for each species needed to control diseases, hitchhikers etc. necessary to codify, as model. Need evidence, more information, to show if is safe commodity.

With Denman Island Disease (causative agent *Mikrocytos mackini*), new technology is available and has been considered, as well as the need for validation of the technology to provide confidence that it is accurate. During a workshop on Denman Island disease, such considerations fostered communication leading to consensus on some issues and agreement on what critical data gaps needed to be addressed. Need good communications, discussions for all issues. Import committee set up in Washington to help facilitate communications. To establish and maintain credibility internationally and with the OIE, the US needs a unified body, consistency among States regarding health. Such a unified body would provide a mechanism to review grievances, and a forum to evaluate issues. ISSC model to be used as a model for national plan has been considered in the past by the shellfish industry. The ISSC model meets scrutiny of outsiders, and the industry can participate in debates on regulations, in a predictable process, but the USFDA makes final decisions. ISSC used to meet every year, now every 2 years. Executive board meets every 6 months. Such a model could be part of implementation phase of NAAHP, but such implementation requires that all States get on board with commitment and budget to appoint responsible representative to the process.

USAHA is another process by which industry can plug into to engage APHIS. USAHA has species-specific and disease-specific committees that have developed standards that APHIS has accepted. If not mandatory, program may not need such formal structure in technical group. There is a FACA model for finfish fish health issues in Maine. Also separate technical work group for ISA.

9. Disease Management:

There is a need to develop disease import and transfer rules. If we find a serious disease in wild or cultured shellfish, how will the U.S. respond? The finding of MSX disease (causative agent *Haplosporidium nelsoni*) in Canada immediately stopped all transfer of all mollusks from the area. All boats and fishing equipment were disinfected under stringent sanitation measures. Then surveillance was started immediately to determine the extent of the problem. This action was initiated by Canada due to a large mortality event. There was economic significance for the oyster production area and also an impact on other cultured shellfish species (large mussel culture area nearby). We are not sure if Canada's actions were reactionary or there was already a plan in place. The plan was very strict for industry in sanitation measures. The Canadian Department of Fisheries and Oceans (DFO) formed

an advisory committee and everyone wanted to be involved in the committee. Consequently, it became unwieldy and was disbanded.

There was a similar response by Massachusetts for the first finding of MSX. For 15 years after the first discovery of the disease, an isolated area was maintained. Subsequently, the disease spread from Connecticut to Massachusetts and then Maine. This suggests that some restriction and quarantine regulations were effective. Funding for continuance of testing was a problem.

Have there been any cases of eradication? Considered in Canada, but determined not feasible. In Massachusetts, many of the stock died out initially and culturists and harvesters have learned to manage around it.

U.S. needs a model response to disease outbreaks or a framework of plan of attack. Eradication could be considered but confirmation and confinement must initially occur. An assessment should be made to determine if eradication is feasible and what further steps may be necessary. NAAHP may be able to use other terrestrial models or aquatic models already in place for emergency actions. Any emergency plan needs expert review and a budget. [Editors note- This is the process that is being used by the Task Force, i.e., ongoing review and comment by public/experts]. To be effective, emergency plan needs to have input from all groups that would take action, such as the Tribes. Agreement from all involved would be needed. With terrestrial animals disease emergencies on Tribal lands, are there differences in how a response is handled by APHIS and other authorities? APHIS works closely with Tribes on disease issues with livestock on Tribal lands. In one situation, a Tribe identified which APHIS individuals would be involved and be on the reservation. Much education and communication is needed in these situations. It is essential that Tribes (or other affected stakeholders) are heard up front and involved in the process of planning for emergencies.

The prevention of introduction of invasive species is also important. Their spread can be almost immediate. Are there any examples of a successful shellfish disease eradication effort? An attempt was to eradicate sabellid polychaetes infesting an abalone species in California, but while the prevalence was initially reduced, eradication was not successful and the infestation has recurred. Rhode Island was concerned about Hawaii-produced hard clam seed sold to growers in the State. The recipient grower is under a requirement to track and monitor closely. The State could have eradicated that small group if needed. There is control program for oyster drills in Washington. This program has reduced the rate and extent of spread of the drills, but it is not an eradication program. Would wild and commercial shellfish stocks be treated similarly under a disease control program if a new finding of shellfish disease was made in wild stock? Eradication may not be possible, and is, in fact, highly unlikely to be successful. Eradication might be possible if found early enough, such as in a confined shellfish bed area and it could be demonstrated not to have spread to others in area. Is there a set of criteria that could be formed for eradication? Such criteria would need to be on a case-by-case basis, but are worth considering. It likely may be too late to implement successful eradication by the time a mortality event is seen

because the disease will have already spread. There is also a need for control and management measures if eradication cannot be accomplished.

Crop insurance is available but has been cost prohibitive, in general. For each disease, control measures, best management practices (BMPs) could be standardized for across country. How might the U.S. administer import controls? Through U.S. Customs? Specific ports, border protection or veterinarians? For any U.S. disease control programs with which an import health certificate for cultured live animals is required, likely APHIS would be involved. Other Federal agencies have border officials that could participate in the clearance of imports. Regardless of which federal agency is responsible for inspecting shellfish imports, there is a need for species specific training manual and a protocol manual. The details are still being worked out in relation to controlling imports that could be carriers of SVC and ISA. Timeliness of inspections will be very important for live products as there are no quarantine facilities at ports of entry for aquatic animals.

10. Emergency/contingency Planning:

NAAHP can consider terrestrial models, i.e. Foot and Mouth Disease, bioterrorism, natural disasters, etc. These types of events have caused U.S. to recognize the need for emergency planning. All realms of agriculture need to work harmoniously with human emergency response planning. Many States have initiated efforts to form SARTs and CARTs (state and county response teams). Model plans are available on the internet. Everyone is able to join, with access to resources, and could give aquaculture input. What could or would happen to tanks, raceways, etc that would jeopardize business or wild stocks? Utility companies would know where you are, needs, etc. Example of emergency response seen during hurricanes in Florida. APHIS employee visited farms to seek out needs during emergency conditions. Teams can work with industry or on larger level. Oil spill or pollution event, flooding, problems with transportation, can all be large impacts for aquaculture. Due to the nature of the live commodity, rapid response for aquaculture is imperative. The Pacific Coast Shellfish Grower's Association Shellfish High Health Program which may be adopted and the details customized for individual growers contains guidelines for emergency response to disease outbreaks.

Efforts to respond need/are organized under one plan. ICS-Incident Command System training is available at all levels of government and community planning. Training programs are available on websites. Training can be prepared at different levels. APHIS learned the ICS system from the U.S. Forest Service who originally developed the system for response to forest fires. A response team was created by the Maine Dept of Agriculture which is a multi-agency cooperation. We can expect that the ICS approach will continue to be used in many situations.

Australia held an emergency aquatic test exercise - see workbooks. Steps of exercise and response are presented.

Equinox 2005 is one test exercise occurring next week in Maine. It is the third test exercise between Canada and U.S. and will take place over 3 day period. This exercise is the most comprehensive of all so far. Field component is also included.

ICS will look at pool of personnel to select from as needed and who have specific skill sets. Personnel are placed in the response structure based on their skills and are assigned a title, duty, and a person who they answer to (not necessarily the person they report to during normal business activities). Each individual has a specific role and specific duties. Response by APHIS to Exotic Newcastle disease in poultry in California (and other regions) is another example of ICS in action. There were many opportunities for involvement in this emergency response program. Appraisal of losses, cleaning up, etc, could help if prepared ahead of time.

Formal workshop ended on the pm of March 17, 2005.

Evaluation forms completed by participants. A tour of the USGS Laboratory given by Jim Winton, fish health program director.

Feedback from evaluation forms:

- The workshop received high marks from all the participants for organization, attaining workshop objectives, facilitation, workbooks, facilities, and appropriate length of meeting.
- All participants agreed or strongly agreed the workshop increased their understanding of the mission of the Task Force to develop a national plan.
- Three participants identified the need for more industry and State involvement, especially from the Gulf region. (Editor's note – In addition to the attendees, three additional industry representatives were invited – one each from the West coast, East coast and the Gulf region, but were unable to attend. Additionally, two scientists from State universities were invited but unable to attend.)
- One participant mentioned that the facilitators allowed ample opportunity for each and every participant to comment.
- A comment was made that emergency planning will be an important tool that we need to embrace in the NAAHP.