Current Status of Transboundary Fish Diseases in the Philippines: Occurrence, Surveillance, Research and Training

Simeona E. Regidor, Juan D. Albaladejo and Joselito R. Somga
Fish Health Section
Bureau of Fisheries and Aquatic Resources
860 Quezon Avenue, Quezon City, Philippines

I. Current Status of Koi Herpesvirus Disease (KHVD) in the Production of Common Carp and Koi Carp

I-1. Production of Common Carp and Koi Carp

a. Production of Common Carp

In 2003, production of common carp (*Cyprinus carpio*) was estimated at 667 metric tons (MT). Most of the production came from the provinces of Luzon particularly Rizal, Laguna, Quezon, Ifugao and Cordillera. The fish is commonly cultured in ponds and some in pens, mainly as monoculture and, to a lesser extent, polyculture with tilapia. Common carp production remains limited because of inadequate supply of fingerlings.

Common carp was introduced from China in 1915. The fish was stocked in several lakes and rivers all over the country. In Luzon, it was introduced in Laguna de Bay, Bato and Baao in Bicol, Paoay Lake in Ilocos Norte, Lake Naujan in Mindoro, and Taal Lake. It was also introduced into Magat River in Nueva Viscaya, Lakes Bato and Buhi in Camarines Sur, and Cagayan River in Isabela. In Mindanao, it was introduced in Lakes Lanao, Mainit and Buluan. Since then, common carp has become prevalent in many rivers, lakes and reservoirs in the country.

In the 1990s, the Bureau of Fisheries and Aquatic Resources (BFAR), through the National Inland Fisheries Technology Center (NIFTC) in Tanay, Rizal, in collaboration with Philippine Council for Aquatic and Marine Research and Development (PCAMRD), and the University of the Philippines Los Baños (UPLB), established common carp farming technology for the upland areas of Rizal, Laguna, Quezon, Ifugao and Cordillera. BFAR-NIFTC served as the main source of fingerlings, as well as other BFAR Centers and Stations situated in Luzon.

At present, BFAR is conducting research for the genetic improvement of this species. The Department of Agriculture (DA) and BFAR boosted carp productivity and has launched a national carp dispersal program by stocking the new genetically-improved fingerlings in Laguna de Bay. This is a product of successful intra-specific breeding of domesticated carp with three strains from Indonesia and Vietnam: the Majalaya, Sukabumi and Vietnam strains. It is also the potential species for other inland bodies of water such as Taal Lake in Batangas, San Roque Dam in Pangasinan, Magat Dam in Isabela, and Lanao Lake and Liguasan Marsh in Mindanao.

b. Production of Koi

There is limited information on koi production in the Philippines. The Ornamental Fish Association of Southern Tagalog is producing koi for the local market. In 2003, their production was about 1.5 million pieces. Another six farms in Pila, Laguna produced about 300,000 koi last year. The BFAR National Fisheries Biological Center (NFBC) is also into production of koi with 50,000 koi were produced last year for the local market. However, the koi they produce is not yet comparable with imported ones when it comes to quality.

There are also ornamental fish traders that import koi for local hobbyists. These koi are usually stocked as ornamentals in concrete ponds in gardens. According to importers, they usually import the best quality koi from Japan.

I-2. Koi Herpesvirus Disease (KHVD) of Common Carp and Koi

So far, KHVD has not yet been reported in the Philippines. When there was an outbreak of mass mortalities of koi and common carp in Indonesia in 2002, BFAR issued a temporary suspension of carp importation in June of that year and conducted a consultation with the aquarium fish traders, hobbyists and concerned government agencies. It was unanimously agreed that koi should be imported from Japan, where there was no reported KHVD at that time. The importer's holding facility shall be inspected by BFAR prior to issuance of import permit. The fish should be in quarantine for 15-30 days and the health status monitored by a Fish Health Officer. However, after the KHVD outbreak in Japan in October 2003, BFAR issued another temporary suspension for importation of koi from all countries in January 2004. All BFAR regional offices and centers were instructed to strengthen their reporting and monitoring of any disease problems of common carp and koi in their area.

II. Current Status of Viral Diseases in the Production of Shrimps and Prawns

II-1. Production of Shrimps

a. Production of Tiger Shrimp (*Penaeus monodon*)

The Philippines attained its highest shrimp production in 1994 with 90,000 MT, making it as the third largest producer in the world. From 1997 to present, total production figures are almost similar (Fig. 1).

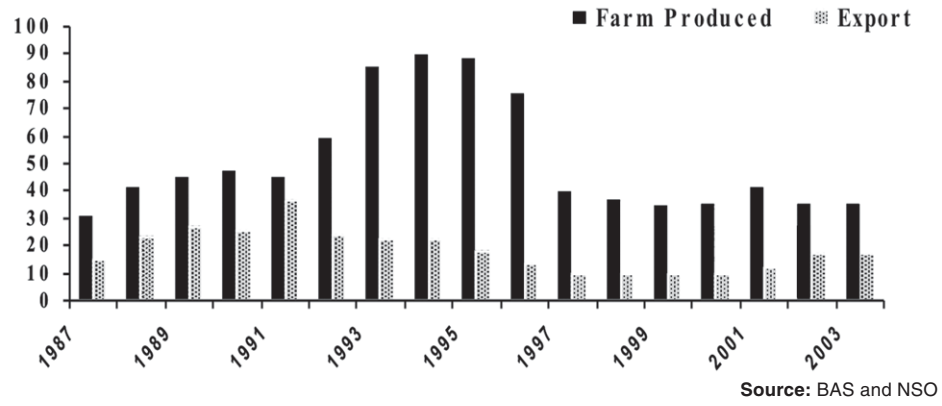

Fig. 1. Philippine shrimp culture production and export, 1987-2003. Production figures are in metric tons ´1,000.

Export figures vary from year to year. The overall production experienced a steady decline starting in 1996 and this was attributed to the increasing environmental degradation and disease problems, particularly luminous vibriosis. This was further aggravated in 1999 with the appearance of white spot syndrome virus (WSSV), first in intensive farms and then in extensive farms in 2002.

Timely intervention of the national government particularly the DA-BFAR started in 1996 through the formation of the inter-agency Task Force, the Oplan Sagip Sugpo, whereby the recovery program for shrimp production was set with immediate and long-term interventions. The program was enhanced by the formation of the Shrimp Task Force in 2000 to undertake the following tasks:

1. Fast track specialized technical support through strengthening of regional laboratories to handle specialized laboratory protocols such as the use of molecular diagnostic procedures, like polymerase chain reaction (PCR), as early detection tools for viruses like WSSV;
2. Disease surveillance to prevent the spread of the viral diseases through active and passive disease monitoring;
3. Promotion of good farm practices through implementation of codes of practice;
4. Adoption of innovations that are environmentally sound and sustainable; and
5. Conduct aggressive continuing education among the national government and private sector field laboratory technicians and fishery extension officers.

Source of Spawners, Broodstock and Postlarvae: Almost 90% of shrimp postlarvae originate from hatcheries, while supply for spawners and broodstock rely mostly on capture fisheries and collectors from wild sources. The remaining 10% of shrimp postlarval supply are wild-caught stocks gathered from nearshore areas during its season for collection. Most of the

successful hatchery operators are located in Western and Central Visayas supplying 60% of the country's postlarval requirement. Traditional wild spawner and broodstock collection sites are in the following areas:

Luzon:	Quezon, Masbate
Visayas:	Capiz, Negros, Bohol, Leyte
Samar:	Surigao, Davao, Misamis Occidental, Zamboanga del Norte

Country of Origin of Imported Stocks: The only known importation of P. monodon into the Philippines came from Thailand in 1992. This was made by Dole Philippines for their production ponds in General Santos City, Mindanao. This introduction prompted the Negros Prawn Producers Marketing Cooperative, Incorporated (NPPMCI) to lobby for the passing into law the prohibition of importation of any exotic shrimp species into the country. Thus, in 1993, Fisheries Administrative Order (FAO) No. 189 was passed. This was on the "Prohibition of the importation of all live stages of shrimps and prawns". In 2001, this Order was amended by FAO No. 207 which includes the prohibition of the culture of imported exotic shrimp species.

Live Export Records: As specified in FAO No. 143-5 and stated in "Amending Section 1, FAO No. 143-4", the exportation of live pond-raised prawns not more than sixty (60) grams per piece is allowed. Live marketable size black tiger shrimp (P. monodon) were exported in small quantities to Taiwan, HongKong and Thailand as part of the live fish trade to these countries.

b. Production of Pacific White Shrimp (*Litopenaeus vannamei*)

The Philippine government, through BFAR has been implementing a total ban in the importation of live shrimps and prawn of all stages as early as 1993 through FAO 189 that was further amended in 2004 to include not just the importation, but also the culture of imported exotic shrimp species. However, the lure of Pacific white shrimp culture resulted in illegal importation of postlarvae of *L. vannamei* originating mostly from Kaoshiung, Taiwan starting in 1998. The illegal shipment is technically smuggling exotic species in the guise of milkfish fry (*Chanos chanos*). Approved permits issued by BFAR for importation of milkfish fry were replaced with the fry of *L. vannamei*. This can be gleaned from the series of confiscations conducted in international airports.

To stop the rampant mis-declaration of live fish to these ports, the following BFAR office directives were issued (see Box):

- Shrimp Importation Monitoring and Surveillance Task Force - created on January 14, 2003;
- Fisheries Memorandum Order No. 078, Series of 2003 - Restricts entry of live fish species imported from Taiwan and China. Entry of live fish from either Taiwan or China, particularly milkfish fry, is restricted to Ninoy Aquino International Airport only;

Date	Airport	Volume confiscated	Total No.	Value in pesos
22 Sept 2002	Ninoy Aquino Int'l. Airport	63 boxes Milkfish fry and 42 boxes shrimp fry	6.3 M	PHP 1.57M
09 March 2003	Subic Freeport Int'l. Airport	100 boxes shrimp fry	15 M	PHP 3.75M
08 May 2003	NAIA	67 boxes shrimp fry	10.05 M	PHP 2.51 M
07 July 2003	Diosdado MacapagalInt'l. Airport UPS Courier Plane	5 boxes shrimp fry Liquid dietary feed	1.0 M –	PHP 0.6M –
11 July 2003	Laoag Int'l. Airport	44 boxes shrimp fry	6.6M	PHP 2.31M
04 Nov. 2003	NAIA	24 boxes shrimp fry Xiamen, China 3.6M	3.6 M	PHP 1.26 M

- Fisheries General Memorandum Order No. 119, Series of 2003 - Guidelines in the importation of milkfish (bangus) fry, *Chanos chanos*. This is an additional guideline in the implementation of FAO 221 that was issued due to persistent illegal importation of shrimp fry under the guise of milkfish fry; and
- Implementation of the total ban on live shrimp importation was further strengthened with the passing of a resolution by the Philippine Shrimp Industry Association (PHILSHRIMP) fully supporting the ban and urging for the stricter implementation of Fisheries Administrative Order 207, Series of 2001.

c. Production of Freshwater Prawn (*Macrobrachium rosenbergii*)

Commercial production o*f M. rosenbergii* in freshwater ponds and rice-prawn culture systems was given a boost in 2001 after commercial prawn fry production was achieved. The estimated production was 70 metric tons with yearly increase of 10%. However, the bulk of production is still mainly derived from wild caught fisheries with only 10% being contributed by aquaculture. Increase in freshwater prawn aquaculture is promising since new areas for grow-out production (pond and rice-prawn culture) are currently being developed in Regions 1-8 and 11.

II.1. Diseases of Shrimps and Prawn

a. White Spot Syndrome Virus (WSSV)

Viral infections remain untreatable, thus exclusion is the most logical alternative to prevent their entry into culture facilities. This highlights further the need to screen for viruses using the most sensitive and specific method available. A DNA-based PCR protocol developed for WSSV by Tapay *et al*. (1999) has been reported to detect isolates of the virus from various geographic regions like China, Indonesia, Japan, the United States, and India.

Furthermore, the same protocol has been used extensively in testing for WSSV in asymptomatic shrimp from hatcheries and grow-out ponds.

In February 2000, the first mortality associated with WSSV infection in the Philippines was observed in cultured *P. monodon* in Negros Occidental. The causative agent was confirmed as WSSV using PCR (Magbanua *et al.,* 2000).

Sixteen PCR laboratories are currently in place in strategic regional sites conducting comprehensive monitoring and surveillance program. Most postlarvae are checked for WSSV carrier status before shipment to various islands within the country. In 2002, only 35 samples out of 1,115 analyzed (3.14%) were confirmed positive for WSSV, but in 2003, a 5-fold increase in WSSV positive samples was recorded (169 positive samples out of a total of 1,413.

Increased infection rate in 2003 was observed during the cold months of the year starting in October. Mortality in ponds was noted in the months of November to February, resulting to crop failure. In addition to previously recorded infected areas, WSSV infection spread to other shrimp producing provinces as such Davao del Sur, Camarines Sur, Iloilo, Capiz, Lanao del Norte, Masbate, Sorsogon, Samar, Leyte, and Pangasinan.

The impact of WSSV infection is limited in magnitude and spread compared with other countries due to the pro-active program instituted by the Philippine government, through BFAR's "National Action Program to Control WSSV in Shrimp". This program was conceived in March 2000, with the following specific objectives and activities:

1. Exclusion

This approach aims to prevent further introduction of WSSV carriers into the country. Since the most effective carriers of the virus are live shrimps and crustaceans, a complete ban on importation of live shrimps, prawns and other crustacean species is the logical preventive approach. This is implemented by virtue of Fisheries Administrative Order No. 189.

A new FAO was drafted to strengthen FAO 189 to include not only prohibition on the importation, but also the culture of imported live shrimp and prawn of all stages. The draft was presented in a series of regional consultations to various stakeholders, including the National Fisheries Aquatic Resources Management Council (NFARMC) as mandated by Republic Act 8850 of 1998 or the New Fisheries Code. After deliberation and upon endorsement of the Secretary of the Department of Agriculture (DA), Fisheries Administrative Order 207 Series of 2001 was signed into law on 17 May 2001.

2. Containment

The containment approach seeks to prevent the spread of WSSV. As much as possible, WSSV outbreaks should be contained within the areas originally affected so that areas that are still WSSV-negative can be spared from the potentially-devastating effect of the disease. The archipelagic nature of the country and the fact that shrimps can, on their own, potentially move from one part of the country to another makes this approach highly

challenging. Towards this end, five major activities are being implemented, namely:

a. Detection and diagnosis of WSSV;
b. Surveillance and reporting;
c. Regulation of in-country movement of live shrimps, particularly postlarvae or fry stages;
d. Hatchery accreditation scheme; and
e. Promotion of environment-friendly shrimp farming and good farm management practices.

These strategies are envisioned to help improve the quality of shrimp postlarvae being produced and marketed in the country, to raise awareness among hatchery operators on the importance of using healthy shrimp spawners, and to highlight to shrimp growers the importance of using only high-health shrimp fry for stocking in grow-out ponds.

3. WSSV Detection and Diagnosis

Detection of the disease is the most basic requirement for its effective control. Thus, it was given highest priority by BFAR. Since PCR-based diagnostic techniques are currently the most reliable diagnostic tools, BFAR started a program in 2000 with disease surveillance as a focal point and "early detection of the virus" using PCR as a prevention strategy. At present, the BFAR has 16 PCR-capable facilities nationwide strategically located in shrimp growing areas (Table 1).

Table 1. List of PCR-capable facilities

Location of PCR facility	Regional Director Concern	Regional Fish Health Officer
BFAR Regional Office III, Berzon Building, San Agustin, San Fernando	Director Remedios E. Ongtangco	Carmencita Agustin Tel. (045) 9612784 Mobile: 09196698610
BFAR Central Office, 860 Quezon Avenue, Quezon City	Simeona E. Regidor, Chief, Fish Health Section	Juan D. Albaladejo Maria Abegail G. Apostol Tel. (02) 3725055 Mobile: 09173933605 09173672554
Fisheries Quarantine Office, BPI Complex, South Harbor, Port Area Manila	Director Rosa F. Macas	Ms. Ligaya Cabrera Ms. Maritess Guinto Tel. No. (02) 5270718 Mobile: 09198410973 09196505970
Provincial Fisheries Office, Rizal Avenue, San Jose, Occidental Mindoro	Director Virgilio A. Alforque	Ms. Dina dela Reyna Tel. No. (043) 4912138 Mobile: 09196722584
Southeast Asian Fisheries Development Center/Aquaculture Department, Tigbauan, Iloilo	Dr. Rolando Platon, Chief, SEAFDEC-AQD	Dr. Gilda Lio-Po Tel. No. (033) 3351009 Mobile: 09198519028

Table 1 (continuation)

Location of PCR facility	Regional Director Concern	Regional Fish Health Officer
Negros Prawn Producers Marketing Cooperative, Inc., 2nd Door, NEDF Bldg., 6th Street, Bacolod City(Private Sector accredited laboratory)	Mr. Roberto A. Gatuslao, Chair, Board of Director, NPPMCI	M. Roselyn Usero Tel. No. (034) 4332131 Mobile: 09209084599
BFAR Regional Office VII, Arellano St., Cebu City	Director Corazon M. Corrales	Ms. Carol Lopez Tel. No. (032) 2530661 Mobile: 09172512240
Bohol Aquaculture Foundation, Inc., Maribojoc, Bohol (Private Sector accredited laboratory)	Mr. Jimmy Bartolaba, President, BARFI	Ms. Nora Malmis Tel. No. (038) 4115224 Mobile: 09173602304
BFAR Regional Office, Barangay Diit, Tacloban City	Director Gil A. Adora	Mr. Ruben Francisco Tel. No. (053) 3254705
BFAR Regional Office, R.T. Lim, Kawa-kawa, Zamboanga City	Director Abdulgafor N. Abdua	Ms. Carolina S. Moron Tel. No. (062) 9925051 Mobile: 09193065826
BFAR Regional Office, Macabalang, Cagayan de Oro City	Director Arlene B. Pantanosas	Ms. Evie Lumingkit Tel. No. (088) 8569610 Mobile: 09196772736
BFAR Regional Office, Magsaysay Avenue, Davao City	Director George Campeon	Mr. Raul Millana Tel. No. (082) 2245085 Mobile: 09168240915
BFAR-ROS Station, Lala, Lanao del Norte	Director Sani A. Macabalang	Ms. Sarah Mae Mamalangkap Cellphone: 09198003429 Dr. Jane Corcuera Mobile: 09198733730
BFAR Satellite Regional Fisheries Laboratory, Northern Mindanao School of Fisheries Campus, Matabao, Buenavista, Agusan del Norte	Director Alauya R. Olama Al Hadj	Ms. Melissa Lee Talavera Tel. No. (085) 3435255 Mobile: 09196239264
BFAR Regional Fisheries Laboratory, City Engineer Office, Surigao City	Director Alauya R. Olama Al Hadj	Mr. Ilvin Elumba Tel. No. (086) 8265538
National Institute of Molecular Biology and Biotechnology, UP Los Baños, Laguna	Dr. Veronica P. Migo	Dr. Veronica P. Migo Tel. No. (049) 5360587 Mobile: 09189050867

Aside from PCR, the laboratories are also equipped to undertake the following laboratory procedures:

1. Quantitative bacteriology;
2. Shrimp fry quality assessment; and
3. Water quality analysis.

PCR-based diagnosis is a sophisticated and precise technique that requires specialized training. Hence, a complimentary manpower capability-building on the operation of this specialized laboratory procedure was conducted for Regional Fish Health Officers and technicians from accredited private laboratories. Subsequently, on-site hands-on PCR trainings were also conducted with regular proficiency testing of the laboratory technicians to ensure good quality control standards.

In order to standardize the PCR procedure, the National Institute of Molecular Biology and Biotechnology (BIOTECH) of the University of the Philippines in Los Baños and SEAFDEC Aquaculture Department were designated by BFAR as the national reference laboratories for WSSV. These laboratories insure that all diagnostic kits used in the PCR protocol are standardized to keep the integrity and reproducibility of the procedure, and they serve as depository of the virus materials for maintenance and safekeeping. Furthermore, they serve as the agencies to resolve conflict of results that might arise in the conduct of the analysis.

Two non-government organizations, NPPMCI and BARFI, are also involved in the program in order to have participatory collaboration with the private sector by providing them with resources such as PCR equipment, training and technical support. These organizations are actively involved in the exchange of information and formulation of future strategies to control the spread of the viral diseases.

4. Surveillance and Reporting

Even prior to the formulation of the WSSV Control Program, BFAR has been actively involved in the Quarterly Aquatic Animal Disease Reporting System that has been adopted within Asia-Pacific region under the joint programs of the Food and Agriculture Organization (FAO), Network of Aquaculture Centers in Asia-Pacific (NACA) and Office International des Epizooties (OIE). To support this, BFAR requires participating field laboratories to submit monthly reports. Meanwhile passive surveillance in areas not covered by the participating laboratories continues using the National Aquatic Animal Disease Reporting format developed under the FAO/NACA/AusAid/APEC Project.

5. Regulation of in-Country Movement of Shrimp Fry

There is considerable movement of shrimp fry from one province to another due to the demand from shrimp growers. To minimize spread of disease, BFAR strengthened existing regulations covering in-country movement of live shrimps which includes issuance of health certificate/permit, and inspection procedures at ports of entries or origins. In addition, protocols for proper disposal of WSSV-infected postlarvae and for decontamination of WSSV-infected hatchery facilities will be prepared. The following Fisheries Office Orders are in force to insure smooth implementation:

a. Fisheries Memorandum Order No. 240, Series of 2003 concerning regulations on transboundary movement of shrimp postlarvae;
b. Fisheries General Memorandum Order No. 014, Series of 2004 containing the Guidelines for the Implementation of Fisheries Memorandum Order No. 240; and
c. Fisheries Memorandum Order No. 013, Series of 2004 is on imposition of active surveillance mechanism for all shrimp hatcheries nationwide as part of the strict implementation of the National Action Program to Control White Spot Syndrome Virus in shrimp.

Continuing education and training of quarantine officers and laboratory technicians will be pursued on regular basis. Stakeholders in the shrimp industry, such as hatchery operators, shrimp fry traders and growers, will likewise be educated on the importance and benefits of compliance.

6. Shrimp Hatchery Accreditation Scheme

A Fisheries Administrative Order on rules and regulations for issuance of Compliance Certification based on "best practice" in the hatchery was presented for adoption by the Philippine Shrimp Hatchery Association (PHILFRY). Comments and inputs from the deliberation were incorporated in the final draft that was endorsed to the NFARMC for approval of the law.

7. Good Farm Management Practices

To augment the disease prevention strategies, promotion of good culture practices and bio-security measures are being promoted in-farm. This is based on the "Code of Practice for Sustainable Shrimp Farming". Also, promotion of environment-friendly schemes in shrimp farming that have been field-tested by SEAFDEC and BFAR through the Joint Mission for the Accelerated Nationwide Technology Transfer Program will continue.

b. Taura Syndrome Virus (TSV)

Due to the existing ban on importation of exotic shrimp species in the country, there are no reports of TSV infection in the Philippines. At present, SEAFDEC is the only laboratory capable of testing for TSV. Samples submitted to SEAFDEC Aquaculture Department obtained from illegal shipments at airports showed negative results for the virus after analysis using PCR. BFAR is planning to include active surveillance for TSV in its monitoring program.

c. Significant and Emerging Viral Diseases of *Macrobrachium rosenbergii*

Testing for important prawn viruses that might infect local population of *M. rosenbergii* is now included in the National Action Program. Since government and private hatchery operations to produce prawn postlarvae is still inadequate, selective importation of postlarvae and broodstock was allowed to augment the local supply for stocking in ponds, and for genetic diversity and genetic selection programs. Special permits were issued by the

Department of Agriculture through the recommendation of BFAR to import a specific number of prawn from Thailand and Lao PDR. All importations were subjected to pre-border inspection from the country of origin by recognized Fish Health laboratories using techniques to detect economically important diseases of *M. rosenbergii.* Subsequent post-border inspection of the shipment was also performed in the Fish Health Central Laboratory in Manila.

III. Surveillance, Monitoring and Diagnosis of Diseases of Aquatic Animals

III-1. Responsible Facility and Personnel

The Fish Health Section (FHS) of BFAR spearheads the implementation of monitoring of aquaculture farms, and provides diagnostic services as well as technical and advisory assistance to the aquaculture industry. Its monitoring program includes disease surveillance and reporting system, aquatic animal health certification and implementation of quarantine procedures, assessment of the health status of stocks of selected fish, and management of other aquatic resource farms in the Philippines.

The FHS operates a Central Fish Health Laboratory with the responsibility and competence for ensuring or supervising the implementation of the aquatic animal health measures recommended by the OIE and European Commission Directive 2003/858/EC. The FHS develops standardized routine procedures and guidelines for the operation of the 15 Regional Fish Health Laboratories (Fig. 2), supervises the activities, and sets directions for the operation of such laboratories, as well as provides technical guidance to 38 Regional Fish Health Officers (FHOs) on the execution of diagnostic activities and technical assistance on fish health-related problems. It also imparts specialized training programs on fish health for government fishery biologists, extension workers and fish farmers.

Surveillance and monitoring program of farms for diseases and drug residue monitoring was developed to know the animal health situation in the Philippines and in compliance with the requirements of trading partners. As exporter of fresh and frozen aquaculture products to European communities, the FHOs also implement disease monitoring and surveillance in fulfillment to the requirements of EC Directive 2003/858/EC. The FHOs also act as fishery inspectors authorized to certify fish products of aquaculture origin for export into the European Community for human consumption.

a. Regional Fish Health Laboratories

As indicated in Fisheries Office Order No. 211 series of 2003 issued on 28 August 2003, the FHOs shall be responsible for the implementation of residue monitoring report and plan in accordance with European Union Council Directive 96/23/EC in their area of responsibility and perform the following functions: a) assist in planning, directing, and implementing of

Fig. 2. Map of the Philippines showing the location of the Regional Fish Health Laboratories

the national program on fish health management; b) supervise and operate the RFHLs and satellite laboratories in their respective areas of jurisdiction; c) adopt FAO 220, series of 2001 concerning "Operation of the Fish Health Laboratories and Collection of Fees and Charges"; d) conduct fish kill investigation and implement the National Strategy on Fishkill Investigation, Reporting and Prevention; e) provide technical support to the fish inspection and quarantine services; f) act as quality control officer on the regulation of animal feed veterinary drugs and products in aquaculture; and g) submit quarterly accomplishment reports relating to program to the Bureau Director.

b. National Disease Monitoring and Surveillance

Table 2 lists the central and regional FHOs. The Central Fish Health Laboratory provides the technical know-how and formulates mechanisms to coordinate the conduct of disease surveillance, monitoring, and reporting. To harmonize activities on disease surveillance, a monitoring form was developed for field use. Quarterly reports are submitted to the Central Fish Health Laboratory for information and consolidation.

In 2003, disease surveillance and monitoring of 199 shrimp, 80 milkfish and 336 tilapia farms nationwide were conducted (Table 3). No major disease outbreaks were observed in these farms. Shrimp hatcheries were encouraged to screen their fry for WSSV and to conduct fry quality assessment prior to stocking to lessen the risk of disease outbreak.

Table 2. List of Fish Health Officers of the Bureau of Fisheries and Aquatic Resources

Name	Address	Tel. No./Fax
Ms.Rosario Segundina Gaerlan Ms. Marina Dumol	BFAR Region I -West Dagupan Pangasinan	(075) 523 085
Ms. Evelyn Ame Ms. Melba Francisco	BFAR Region II - Tuguegarao, Cagayan	(078) 844 4261
Ms. Carmencita Agustin Ms. Teresita Gulle Mr. Gonzalo Coloma Mr. Manuel Dizon Ms. Maxima S. Sabariaga Ms. Esperanza Gutierrez	BFAR Region III - San Fernando, Pampanga	(045) 961 2784
Ms. Ligaya Cabrera Ms. Josephine de la Vega Ms. Marilou Mosqueda Mr. Lazardo D. Lucido Ms. Maurita Rosana Ms. Elvira Casao Ms. Nenita Kawit Mr. Julian Clemente	BFAR Region IVA - FFRS, Los Banos, Laguna	(049) 536 0705
Mr. Rolando C. Miranda Ms. Dina de la Reyna Ms. Imelda Malabanan	BFAR Region IV-B - San Jose, Mindoro, Occidental	

Table 2 (continuation)

Name	Address	Tel. No./Fax
Ms. Simeona E. Regidor Ms. Mercedita A. Bantaya Dr. John D. Albaladejo Dr. Joselito R. Somga Ms. Abegail Aposto Dr. Sonia S. Somga	BFAR-Central Office, Central Fish Health Laboratory, 860 Quezon Avenue, Quezon City	(02) 372 5055
Ms. Edna Tud Ms. Irmi Mora	BFAR Region V - Mercedes, Camarines Sur	(054) 477 3948
Ms. Pricilla Pangantihon Ms. Evelyn Abad Ms. Helen Bandojo Ms. Balylou U. Tizon	BFRA Region VI - Muelle Loney St. Iloilo City	(033) 336 9878
Ms. Carolina Lopez Ms. Emma Gultiano Dr. Tom Cuyos	BFAR Region VII - Arellano Blvd., Cebu City	(032) 253 0661
Ms Remedios Lequin Mr. Ruel Amascual Ms. Maribel Dioloa Mr. Ruben Francisco Ms. Sharimae Lequin Ms. Guinevere Ramos	BFAR Region VIII - Brgy. Diit, Tacloban City	(053) 321 3152
Ms. Carolina Moron Ms. Sherdalyn A. Sajili Ms. Eden A. Alvarez Ms. Evelyn M. Salve Ms. Grace P. Dueay Ms. Rachel L. Tenorio Mr. Bonifacio Duterte	BFAR Region IX - RT Lim Blvd., Zamboanga City	(088) 856 9610
Ms. Evie Lumingkit Ms. Riza P. Pacuno	BFAR Region X - Macabalan, Cagayan de Oro City	(062) 991 8192
Mr. Raul Millana Dr. Celeste Santos Dr. Eb Morandante Ms. Madeleine Navarce	BFAR Region XI - Magsaysay Ave., Davao City	(064) 421 1213
Ms. Sarah Mae Mamalangkap Dr. Jane Corcuera Ms. Liberty Lagang	BFAR Region XII - General Santos City	(082) 224 5058
Ms. Anna Melissa Talavera Mr. Ilvin Celumba Mr. Vito A. Gamos	BFAR Region XIII - Surigao City, Surigao del Norte	(085) 343 5255
Ms. Cheryl Dimacisil Ms. Bambai A. Macargas Mr. Datumanong Dimacisil	Autonomous Region of Muslim Mindanao - ORG Complex, Cotabato City	(064) 421 1234
Ms. Petra Gayagay Mr. Roderick S. Pangan	Cordillera Autonomous RegionGuisad, Baguio City	(074) 443 6716

Table 3. Summary of farm visits by the Fish Health Officers in 2003

	Number of Farms Visited											Total
Region	**II**	**III**	**IV**	**V**	**VI**	**VII**	**IX**	**X**	**XI**	**XIII**	**CAR**	
Shrimp		50	8	4	7	19	30	20	16	45		199
Milkfish					4	5	55	13	3			80
Tilapia	154	55	61			7	50	6			3	336

III-2. Diagnostic Capabilities and Major Diseases of Aquatic Animals

The laboratories that conduct fish disease diagnosis and their corresponding level of diagnosis are listed in Table 4. Following are the levels of diagnosis: Level I: diagnostic activity limited to observation of animal and the environment, and clinical examination (on-site or field diagnosis); Level II: diagnostic activity includes parasitology, bacteriology, mycology and histopathology (laboratory diagnosis); and Level III: diagnostic activity includes virology, electron microscopy, molecular biology, and immunology (laboratory diagnosis).

a. Economically-Important Diseases in the Philippines

Significant disease outbreaks that caused mass mortalities of wild and cultured fish stocks are listed in Table 5. *Aphanomyces invadans*, a fungus, in association with *Aeromonas hydrophila* caused mass mortality of wild populations of *Clarias batrachus*, *Ophicephalus striatus* and *Mugil cephalus*. The outbreak started in 1985 in Luzon and was recently reported in Lake Lanao. Epizootic Ulcerative Syndrome (EUS) was confirmed by the presence of fungal hyphae in tissue sections of *Glosogobius guirius* caught in the lake.

Reports from Roxas City in Panay Island of mortality caused by parasitic diseases like monogeneans on the body surface and gills of fry of brown spotted grouper were received. It was reported that outbreaks are also occurring in Mindoro and Palawan, the sources of grouper fry. Another parasite, *Caligus epidemicus,* caused mass mortality of tilapia and milkfish cultured in brackishwater farms in Negros Occidental, Zambales, Bicol and Pagbilao, Quezon. One more parasite, an isopod identified as *Corallana grandiventra*, has been the cause of losses among tilapia cultured in cages at Taal Lake, a freshwater lake. Mortality of up to 100% was reported causing some fish farmers to cease operation.

Diseases outbreaks in *P. monodon* caused by *Vibrio* spp. have been associated with mass mortalities. *Aeromonas hydrophila* has been reported in fish mortalities associated with *Aphanomyces invadans* in EUS-infected fish.

b. Current Needs and Requirements

Although disease and drug residue surveillance and monitoring are in place, the activities need a lot of improvement. At the moment, project proposals are in the pipeline to upgrade the existing capacity and capability of BFAR Fish Health Section. There is a need to develop a proposal on

Table 4. List of official Fish Health Laboratories

Region	Location	Contact Person	Tel. No./Fax No.	Diagnostic Level
A. BFAR Fish Health Laboratories				
1	West Dagupan, Pangasinan	Ms. Marina Dumol	(075) 523 085	I,II-ab
2	Tuguegarao, Cagayan	Ms. Evelyn Ame	(078) 844 4261	I,II-ab
3	2nd Floor Berzon Bldg, San Agustin City, San Fernando, Pampanga	Ms. Carmencita Agustin	(045) 961 2784	I,II-ab
4-A	FFRS, Los Banos, LagunaAmbulong Tanauan, Batangas	Ms. Ligaya Cabrera	(049) 536 0705	I,II-a,III-a
4-B	Grnd Flr ICC Bldg. NIA Cmpd, EDSA Quezon City	Mr. Rolando C. Miranda	(02) 421-2138 (02) 928-2051	I,II-ab I,II,III
NCR	Central Fish Health Laboratory 860 Quezon Avenue, Quezon City	Ms. Simeona E. RegidorDr. Sonia S. Somga	(02) 372 5055	I,II-abc,III-ad
5	Mercedes, Camarines Sur	Ms. Edna Tud	(054) 477 3948	I,II-ab
6	Muelle Loney St., Iloilo City	Ms. Pricilla Pangantihon	(033) 336 9878	I,II-ab
7	Arellano Blvd., Port Area Cebu City	Ms. Carolina Lopez	(032) 253 0661	I,II-ab,III-a
8	CRM Center, Diit, Tacloban City	Ms Remedios Lequin	(053) 321 3152	I,II-ab,III-a
9	RT Lim Blvd., Kawa-kawa, Zamboanga City	Ms. Carol Moron	(088) 856 9610	I,II-ab,III-a
10	Macabalan, Cagayan de Oro City	Ms. Evie Lumingkit	(062) 991 8192	I,II-ab,III-a
11	Magsaysay Ave., Davao City	Mr. Raul Millana	(064) 421 1213	I,II-ab,III-a
12	Vensu Bldg., National H-way General Santos City	Ms. Sarah Mae Mamalangkap	(082) 224 5058	I,II-ab
13	Surigao City, Surigao del Norte	Ms. Anna Melissa Talavera	(085) 343 5255	I,II-ab,III-a
14	ARMM ORG Complex, Cotabato City	Ms. Cheryl Dimacisil	(064) 421 1234	I
CAR	Cordillera Autonomous RegionGuisad, Baguio City	Ms. Petra Gayagay	(074) 443 6716	I,II-ab
B. Other Government and Private Fish Health Laboratories				
4	Nat'l Institute of Mol. Bio. & Biotech-UP, Los Banos, Laguna*	Dr. Veronica P. Migo	(049) 536 0547/ 536 2724	I,II,III
6	SEAFDEC-AQD, Tigbauan, Iloilo	Dr. Gilda Lio Po	(033) 336 2937	I,II,III
6	Negros Prawn Producers Mktng Cooperative, Inc. JTL Bldg., BS Aquino Drive, Bacolod City	Ms. Roselyn Usero	(034) 433 2131	I,II-ab,III-a
7	Bohol Aquaculture Research Foundation, Inc., Maribojoc, Bohol	Mr. Daniel Vergara	(038) 504 9211	I,II-ab,III-a

*National reference laboratory NCR = National Capital Region

quarantine, including a national program on monitoring and surveillance of emerging diseases such as, but not limited to, TSV, KHV and viral nervous necrosis (VNN). Assistance is also very much needed to implement the Technical Implementing Guidelines on Asia Regional Technical Guidelines on Health Management for Responsible Movement of Live Aquatic Animals and the Beijing Consensus and Implementation Strategy.

Table 5. Partial list of economically-important diseases of aquatic animals

Name of Disease	Affected Animals	Level of Diagnosis
Fungal		
Epizootic Ulcerative Syndrome	*Ophicephalus striatus* *Clarias batrachus* *Glossogobius giurius*	Level III
Parasitic		
Monogeneasis	*Epinephelus tauvina*	Level II
Caligosis	*Oreochromis niloticus* *Chanos chanos*	Level II
Isopodiasis	*Oreochromis niloticus*	Level II
Bacterial		
Vibriosis	*Epinephelus tauvina* *Penaeus monodon* *Tilapia hornorum*	Level III
Aeromonasis	*Ophicephalus striatus* *Clarias batrachus*	Level II
Viral		
White Spot Disease	*Penaeus monodon*	Level III, PCR

IV. Quarantine Services to Prevent Entry of Diseases of Aquatic Animals

IV-1. Responsible Agency and Personnel

a. Laws and Regulations

BFAR is the government agency responsible for the implementation of fisheries inspection and quarantine services as mandated by Republic Act 8550, section 67. Implementing rules and regulations are issued in the form of Fisheries Administrative Orders to properly implement the law. For the transboundary movement of live fish and fishery/aquatic products, the FAO No. 221, Series of 2003 was enacted. It contains the implementing rules and regulations pertaining to the importation of live fish and fishery/aquatic products to include microorganisms and bio-molecules. The following are the relevant documents for implementation of the movement of live aquatic animals:

a) Fisheries Administrative Order No. 220, Series of 2001 pertains to the operation of Fish Health laboratories and collection of fees and charges therefore;
b) Fisheries Administrative Order No. 207, Series of 2001 prohibits the importation and culture of imported live shrimp and prawn of all stages;
c) Fisheries Administrative Order No. 221, Series of 2003 regulates further the importation of live fish and fishery/aquatic products under FAO No. 135 Series of 1981 to include microorganisms and bio-molecules;

d) Fisheries Office Order No. 211, Series of 2003 is an amendment to Fisheries Office Order No. 147-01, Series of 2001 and pertains to designation of Regional Fish Health Officers;
e) Fisheries Memorandum Order No. 240, Series of 2003 pertains to Regulations on Transboundary Movement of Shrimp Postlarvae;
f) Fisheries Memorandum Order No. 078, Series of 2003 pertains to Restriction on Entry of Live Fish Species Importation from Taiwan and China;
g) Fisheries General Memorandum Order No. 014, Series of 2004 are Guidelines for the Implementation of Fisheries Memorandum Order 240; and
h) Fisheries Memorandum Order No. 013, Series of 2004 pertains to the imposition of active surveillance mechanism for all shrimp hatcheries nationwide as part of the strict implementation of the National Action Program to Control White Spot Syndrome Virus (WSSV) in shrimp.

b. Responsible Facilities and Location

There are two sections in BFAR that have responsibility over the movement of live aquatic animals: the Fish Health Section under the Office of the Director, and the Foreign Trade and Miscellaneous Permit Section under the Fisheries Regulatory and Quarantine Division.

The Fish Health Officers and the Fisheries Quarantine Officers (FQOs) implement the health management process as defined in the Asia Regional Technical Guidelines on Health Management for Responsible Movement of Live Aquatic Animals and the Beijing Consensus and Implementation Strategy. The FHO implements the pre-border (exporter) and post-border (importer) activities, and the FQO is concerned with border activities in the transboundary movement of live aquatic animals. Table 6 lists the Fisheries Quarantine Officers.

c. Conduct of Quarantine and Inspection Services

As outlined in FAO 221, all importation of live fish and fishery aquatic products, aquatic microorganisms, bio-molecules, including genetically modified organisms (GMOs) and endangered species will be categorized by BFAR, in cooperation and coordination with the Bureau of Plant Industry, Bureau of Animal Industry, and Protected Areas and Wildlife Bureau into the following: low risk species, medium risk species, high risk species, and prohibited or banned species.

IV-2. Procedures and Requirements for Importation

a. Filing

The importer must show intention to import live fish and fishery/aquatic products including microorganisms and bio-molecules through the filing of his application at least five working days prior to the importation of low risk species, and 10 to 15 days for medium risks species. The decision whether or

not to import high risk species will be given thirty (30) days after evaluation of the proposal and other documents which may be required by the Import Risk Analysis (IRA) Panel.

b. Review by Import Risk Analysis Panel

All importation is subject to review by the IRA Panel that shall serve as the secretariat and clearing house of all IRA cases and may tap a group of experts to resolve individual cases whenever necessary. The panel shall be chaired by a Fish Health Officer and has five permanent members who shall have the following minimum qualifications: a) one member shall be a member of the Philippine Bar; b) one member shall be a fish health officer; c) one member shall be a regulatory fisheries quarantine officer; d) one member shall be a member of NFARMC; and e) one member shall be a fishery biologist (on call, depending on the required expertise). The importation requirements are dependent on the category of the commodity which will be listed in the permit issued by BFAR (Section 7 FAO 221).

c. Importation Requirements According to Section 7 of FAO No. 221

1) For low risk species - duly accomplished form. Risk analysis shall not be required except when there is a reported significant outbreak in the county of origin.
2) For medium risk species
   i. Duly accomplished application form;
   ii. Duly accomplished proposal form with emphasis on health, ecological and genetic impacts of the proposed importation;
   iii. Import risk analysis (IRA) by the IRA Panel;
   iv. Health Certificate from the competent authority of the country of origin to be presented upon arrival; and

Table 6. List of Fisheries Quarantine Officers

Name	Area of Assignment	RegionTel/Fax No.
Atty. Analiza Vitug Chief, Regulatory and Quarantine Division Mr. Edwyn Alesna OIC, Foreign Trade Section	National	372-5046
Mr. Orlando Lagoy	Water Ports of Ilocos Norte Laoag City, Ilocos Sur, Pangasinan and La Union	**I** Tel. (072)710-127
Mr. Lorenzo de la Cruz	International Airport, Laoag City	Fax (072)242-1559
Ms. Marina B. Dumol	All major markets in Region 1	
Mr. Benjamin N. Baculi Mr. Loreto T. Lacerna, Jr Mr. Roberto T. Labang	Regional-FQS	
Mr. Cornelio A. Sebastian Mr. Leo S. Palolan	MCS Office-Appari/Port Irene/Sta Ana	

Table 6 (continuation)

Name	Area of Assignment	RegionTel/Fax No.
Mr. Reynaldo P. Lucas Mr. Leonido R. Apolinario	Sta Predex Checkpoint-Cagayan	
Mr. Jessie Gaspar Mr. Samual A. Trinidad	Ports of Aparri and Sta Ana, Cagayan Checkpoint-Camalaniugan, Cagayan	**II** Tel. (078) 8044252 Fax (078)844-5331 (078)846-3661
Mr. Arsenio Tagaca	Airport-Tuguegarao City	
Mr. Rommel U. Arteta Mr. Rogelio N. Tejada Mr. Kenneth A. Abalos Mr. David A. Anuma Mr. Virgilio F. Viernes	Sta Fe and Nueva Viscaya Checkpoint	
Mr. Jorge A. Mogol Mr. Hilarion P. Vinuya	Lamao, Port, Limay, Bataan BASECO, Mariveles, Bataan	**III** Tel. (045) 9635515 Tel./Fax (045)9612784
Mr. Ernesto V. Pangan	Clark International Airport	
Mr. Felizardo C. Francisco Ms. Erlinda A. Quintos Mr. Nelson B. Bien	Subic International Airport and Seaport of Zambales, Shipyard	
Mr. Felipe I. Santamaria Mr. Ben Curativo Mr. Mario Trio	FQS-Ninoy Aquino International Airport FQS-Manila Domestic Airport	
Ms. Leticia Castroverde Mr. Rex Sta Maria Mr. Wilfredo Carbonel Mr. Roberto Arcegono		**IVA** Tel. (02) 926-8714 (02) 9261901 Fax (02) 926-8616
Mr. Baltazar T. Macas, Jr. Mr. Roque Torres Mr. Eliseo Encarnacion Mr. Joel Gutierrez Ms. Soledad Cajulis Mr. Edwin Espiritu Mr. Alberto Exclamador	FQS-South HarborMICP International Fisheries Quarantine Metro Manila	
Mr. Arnulfo Gil Mr. Arturo Pagjunasan	North Harbor-FQS	
Mr. Agripino Cantiga Mr. Eladio A. Comendador Ms. Teresita Cañezal Mr. Oliver A. Comia Mr. Monro Gulle Mr. Ramon Antonio Villalobos	FQS-Navotas	
Mr. Salvador Boncodin Ms. Margarita Panganiban Ms. Leonila Manalo	FQS-Batangas Port ,Batangas City	
Mr. Mario Abueg Mr. Celso Almonte	FQS-Puerto Princesa City Palawan	
Mr. Paciano Gianan Mr. Basilio Buban Mr. Jose B. Glanan	MCS Palawan	

Table 6 (continuation)

Name	Area of Assignment	RegionTel/Fax No.
Mr. Ronald Fabiano Mr. Rey Templonuevo Ms. Elsa S. Cruz	Coron Fisheries Station-Coron, Palawan	
Mr. Samuel Caligdong Mr. Franklin Sitchon Ms. Estrella Caligdong Mr. Ramilo Fadriquilan	Brooke's Point, Palawan	**IV B** Tel. (02)421-2138 (02)928-2051
Ms. Sonia Elloso Ms. Juanita Amurao Mr. Glenn Ladlana Mr. Cesar Ramos Mr. Domingo Timbal Mr. Felipe Hernandez	FQS-Dalahican, Lucena City	
Mr. Rex Gonzales Mr. Reynalso Laurena	FQS-San Jose. Occidental Mindoro	
Mr. Vicente de Galicia	FQS-Boac, Marinduque	
Mr. Jjacobo Lloca	FQS-Romblon	
Mr. Ernesto B. Arandia Ms. Cherry F. Calaveron	FQS Regional	
Mr. Reynaldo Vega	Albay and Catanduanes	
Mr. Prudencio Bongalos Mr. Roberto Borbe	Bulan and Matnog Sorsogon	**V** Tel. (054)336-6748 Fax (054)361-2325
Mr. Raul Tosoc	Camarines Norte	
Mr. Wilfredo Bustamante Mr. Jesus Badillo	Masbate	
Mr. Francisco Ombao	Camarines Sur	
Ms. Irmi Mora	Fisheries Diagnostic Laboratory	
Mr. Hitler S. Seville-CFQO Mr. Edwin Javier Ms. Leni Janco Ms. Amedeo Alvaniz	FQS-Region-wide	
Mr. Ronald Articulo Mr. Roque Leonoras Mr. Nestor Bandada Mr. Alfredie Manosa	Iloilo City Seaport	**VI** Tel. (033) 337-0265 (033) 336-6748 Fax (033)336-9432
Mr. Salvador Herbona	Bacolod City-Seaport	
Mr. Nimrod John Faicol	Bacolod City-Airport	
Mr. Egner Javier	Aklan Seaport & airport	
Mr. Jose Marie Ascona	Roxas City Seaport and airport	
Mr. Jeffrey D. Cortes	Regional office No. VII	

Table 6 (continuation)

Name	Area of Assignment	RegionTel/Fax No.
Mr. Randolph M. Corrales	Cebu Intl Port & Cebu Domestic Seaports	
Mr. Juanito Villordon	Cebu outports and sub-ports	**VII**
Mr. Anacleto Talagon Ms. Cynthia Makinano Mr. Alexander Montuya	Mactan-Cebu International Airport	Tel. (032)256-2775 Fax (032)256-2773
Mr. Leonardo Aro	Port of Dumaguete, Negros Oriental	
Mr. Warren S. Inao	Port of Siquijor	
Mr. Allan Poquita	Port of Tagbilaran, Bohol	**VIII**
Ms. Vicitatacion Elmido	Isabel Port, Isabel Leyte	Tel. (053)321-4801 Fax (053)325-3113
Ms. Romualda Pelen	Tacloban Seaport, Tavloban City	
Ms. Rosalinda Cañas	Ormoc Port, Ormoc CityAlbuera Port, Albuera Leyte	
Ms. Rosella G. Contreras Mr. Abdulgamar S. Mohamad	FQS- Regional	
Mr. Pedling S. Munap Mr. Abdulbasar S. Cuevas	Sea Port Area	
Mr. Abelardo M. Francisco	Airport Area	**IX** Tel. (062)992-5071 Fax (062) 993-2046
Mr. Joseph C. Florig	Dipolog City	
Mr. Mateo O. Cabillo	Dapitan Roxas Zamboanga del Norte	
Ms. Estrella C. Macapobre	Ipil Sibugay	
Ms. Merly Q. Pao	Pagadian City	
Ms. Mona T. Macabuat	Isabela City, Basilan Province	
Mr. Teodoro B. Bacolod, Jr.	Regional Office No. X & Port of Cagayan de Oro	**X**
Mr. Socrates C. Quibalat		Tel. (088 8569610 Fax (088) 856-5658
Mr. Vivencio Garfin	Port of Cagayan de Oro	
Mr. Lauro Galindo	Lumbia Airport, Cagayan de Oro	
Mr. Nerio Piola	Port of Ozamis	
Mr. Marnito Piloton	Port of Benoni	
Mr. Raul C. Millana Mr. Noel L. Manalo Mr. Eric D. Ria	Regionwide	
Mr. Alberto L. Escabarte Mr. Pepto F. Origenes Ms. Mary Ann Cuario Mr. Zaharudin L. Abdulrasid	Davao Fish Port Complex	

Table 6 (continuation)

Name	Area of Assignment	RegionTel/Fax No.
Mr. Dennis Mascarino Mr. Edwin W. Cabalud	Davao International Airport	**XII** Tel. (064)421-89-31 Fax (064)429637
Mr. Joel S. Garcia Mr. Marlon A. Teves	Sasa Wharf	
Mr. Date N. Dimerin	Regionwide	**XIII** Tel. (086)2325435 Fax (085)3412044
Ms. Ruth Bagalogos	Port of Iligan	
Ms. Regina P. Benban Mr. Radzqari A. Abdua	Port of General Santos City	
Mr. Cesar G. Mapula	Intl Airport, General Santos City	
Mr. Antonio Boiser	Surigao City	
Mr. Hedjarah M. Manding	Bancasi Airport, Butuan City	
Mr. Edgardo Bangahon	Nasipit Port, Butuan City	
Mr. Mansueto Cadeliña	Lipata Port, Surigao City	
Ms. Paz Rizalei Lansilay	Port Surigao City	
Ms. Prescilla Maramba Ms. Petra Gayatgay	FQS-RegionFish Health Officer	**CAR** Tel. (074)4436716 Fax (074)4436716
Mr. Abdhulhan S. Sabdani Mr. Bonifacio B. Boglosa Mr. Alonto D. Jualhal Mr. Nilo S. Katada Mr. Terry Posadas Mr. Jerusalem B. Abdulahim Mr. Eduardo E. Arboleda Mr. Macmod D. Mamalangkap	Regional Office	**ARMM** Tel. (064)4211248 Fax (064)421-1234
Mr. Sukarno B. Anayatin Mr. Salik A. Biruar Ms. Gloria C. Ramillano	Maguindanao Province	
Mr. Faizal A. Nahul Mr. Muin Noor Mr. Ibnu Imlah Mr. Rudy S. Canizares Mr. Aynun Racelis	Bongaso, Tawi-tawi Province	
Mr. Gamal S. Tawasil Mr. Said O. Abud Mr. Idlasan G. Ijira Mr. Alano A. Alihuddin Jr.	Jolo Sulu Province	
Mr. Subaer Gandamra Mr. Tingcal Salic	Lanao del Sur Province	

v. The quarantine and inspection requirements shall be based on the decision of the BFAR IRA Panel which may require a quarantine period of 24-28 days on a case to case basis after the release of the shipment from the airport to the BFAR quarantine facility, with costs to be borne by the importer.

3) For high risk species
   i. Duly accomplished application form;
   ii. Duly accomplished proposal form with emphasis on health, ecological and genetic impacts of the proposed importation;
   iii. Import risk analysis by the IRA Panel;
   iv. Health certificate from the competent authority of the country of origin to be presented upon arrival of the consignment at the NAIA or other designated ports of entry. On a case to case basis, BFAR may specify certification requirements for individual species and/or shipments to ensure freedom from specified diseases as deemed necessary; and
   v. Quarantine and inspection until the first generation (F1) offspring. This will be imposed after release of the shipment from the airport to the BFAR quarantine facilities, with costs to be borne by the importer.

d. Inspection

For security purposes, live fish and fishery/aquatic products are subjected to inspection requirements upon arrival at the NAIA, the only allowed point of entry for live fish and fishery/aquatic products. The importer is required to submit documents (original copy of the import permit, photocopies of pro-forma invoice, packing list, and airway bill or bill of lading) to the BFAR Fisheries Quarantine Officer.

For medium and high risks species, a copy of health certificate is required. Consignments not accompanied by import permit and/or health certificate shall be confiscated and destroyed. The Fisheries Quarantine Officer shall check the species identity and conduct visual inspection. If the fish is clearly unhealthy, the quarantine officer will require treatment of the shipment in the importer's holding facility under the supervision of a fish health officer. If the unhealthy fish poses high risk of contaminating healthy stocks, the shipment shall be confiscated and destroyed. Laboratory examination of samples obtained from the shipment shall be conducted by the BFAR Fish Health Officer at the expense of the importer.

IV-3. List of Quarantinable Diseases of Aquatic Animals in the Philippines

The Philippines uses the existing list in the Quarterly Aquatic Animal Disease Report (Asia and the Pacific) jointly published by NACA and FAO, and the list of diseases in the International Aquatic Animal Health Code of the OIE.

V. Research and Training of Fish Health Staff for Quarantine, Diagnosis and Surveillance of Diseases of Aquatic Animals

a. Current Research Activities

Most of the researches on diseases of fish are being implemented by the Southeast Asian Fisheries Development Center. Table 7 shows the list of agencies, departments and universities doing research on fish disease in the Philippines.

Table 7. List of the agencies, departments, and universities that conduct fish disease research

Universities	
National Institute of Molecular Biology and Biotechnology, University of the Philippines Los Baños Laguna Tel. No. (049) 5360587 c/o Dr. Veronica Migo	National Science Research Institute, University of the Philippines Tel. No. (02)-920-7730 c/o Dr. Auxilia T. Siringan
College of Fisheries, Central Luzon State University Tel. No. (044) 456-0681 c/o Dr. Paul Yambot	Division of Biological Sciences College of Arts and Sciences University of the Philippines in the Visayas, Miag-ao, Iloilo c/o Dr. James L. Torres
International	**Government Agency**
Fish Health Section, SEAFDEC Aquaculture Department, Tigbauan, Iloilo Tel. No. (033) 511-9171 c/o Dr. Gilda Lio-Po	Fish Health Section Bureau of Fisheries and Aquatic Resources Tel. No. 372-5055 c/o Ms. Simeona E. Regidor
Private Laboratory	
Negros Prawn Producers Marketing Cooperative, Inc. G/F JTL Building, North Drive, Bacolod City Tel. No. (034) 433-2131 c/o Ms. Roselyn C. Usero	

b. Recent Publications on Viral Diseases of Fishes and Shrimps

Following are the publications on viral diseases from 1998-2003:

1. Albaladejo JD, Tapay LM, Migo VP, Alfafara CG, Somga JR, Mayo SL, Miranda RC, Natividad KD, Magbanua PO, Itami T, Matsumura M, Nadala Jr ECB, Loh PC. 1998. Screening of shrimp viruses in the Philippines. *In*: TW Flegel (ed). Advances in Shrimp Biotechnology. National Center for Genetic Engineering and Biotechnology, Bangkok, Thailand, p. 251-254
2. Catap ES, Traviña RD. 2005. Experimental transmission of hepatopancreatic parvovirus (HPV) infection in *Penaeus monodon* postlarvae. Diseases in Asian Aquaculture V (in press)
3. Catap ES, Lavilla-Pitogo CR, Maeno Y, Traviña R. 2003. Occurrence, histopathology and experimental transmission of hepatopancreatic parvovirus (HPV) infections in *Penaeus monodon* postlarvae. Dis. Aquat. Org. 57:11-17

4. Lio-Po GD. 1998. Studies on several viruses, bacteria and fungus associated with Epizootic Ulcerative syndrome (EUS) of several fishes in the Philippines. Ph.D. Dissertation, Department of Biological Sciences, Simon Fraser University, Burnaby, British Columbia, Canada, 247 p
5. Lio-Po GD. 2001. Viral diseases. *In*: Lio-Po GD, Lavilla CR, Cruz-Lacierda ER (eds) Health Management in Aquaculture. SEAFDEC Aquaculture Department, Tigbauan, Iloilo, Philippines, p. 9-24
6. Lio-Po GD, Cruz-Lacierda ER, de la Peña LD, Maeno Y, Inui Y. 2002. Progress and current status of diagnostic techniques for marine fish viral diseases at the SEAFDEC Aquaculture Department. *In*: Inui Y, Cruz-Lacierda ER (eds) Disease Control in Fish and Shrimp Aquaculture in Southeast Asia-Diagnosis and Husbandry Techniques. Proceedings of the Seminar Workshop organized by SEAFDEC-AQD and OIE; 2-6 December 2001; SEAFDEC, Iloilo, Philippines. p. 97-106
7. Lio-Po GD, Traxler GS, Albright LS. 1999. Establishment of cell lines from catfish (*Clarias batrachus*) and snakehead (*Ophicephalus striatus*). Asian Fish. Sci. 12:345-349
8. Lio-Po GD, Traxler GS, Albright LS, Leaño EM. 2000. Characterization of virus obtained from snakehead (*Ophicephalus striatus*) with epizootic ulcerative syndrome (EUS) in the Philippines. Dis. Aquat. Org. 43:191-198
9. Lio-Po GD, Albright LS, Traxler GS, Leaño EM. 2001. Pathogenicity of the epizootic ulcerative syndrome-(EUS) associated rhabdovirus to snakehead *Ophicephalus striatus*. Fish. Pathol. 36:57-66.
10. Lio-Po GD, Albright LS, Traxler GS, Leaño EM. 2003. Horizontal transmission of the EUS rhabdovirus in stimulated natural conditions. Dis. Aquat. Org. 57:213-220
11. Maeno Y, de la Peña LD, Cruz-Lacierda ER. 2002. Nodavirus infection in hatchery-reared orange-spotted grouper, *Epinephelus coioides*: First record of viral nervous necrosis (VNN) in the Philippines. Fish Pathol. 37:87-89
12. Maeno Y, de la Peña LD, Cruz-Lacierda ER. 2003. Development of control methods for factors suppressing sustainable production of aquaculture species: Experimental transmission of piscine nodavirus-induced viral nervous necrosis to the orange-spotted grouper *Epinephelus coioides*. *In*: Ogawa Y, Ogata HY, Maeno Y, Shimoda T, Fujiioka Y, Fukuda Y (eds) Proceedings of the 2nd Workshop of the JIRCAS International Collaborative Research: "Studies on Sustainable Production Systems of Aquatic Animals in Brackish Mangrove Areas" Dec. 2-3 2002, Penang, Malaysia. JIRCAS, Tsukuba, Japan and Department of Fisheries, Kuala Lumpur, Malaysia. p. 89-94
13. Maeno Y, de la Peña LD, Cruz-Lacierda ER. 2004. Susceptibility of cultured marine fish species to piscine nodavirus from orange-spotted

grouper, *Epinephelus coioides*, in the Philippines. Fish Pathol. (in press)
14. Maeno Y, de la Peña LD, Cruz-Lacierda ER. 2004. Mass mortalities associated with viral nervous necrosis in hatchery-reared sea bass *Lates calcarifer* in the Philippines. Japan Agricultural Research Quarterly 38:69-73
15. Magbanua PO, Natividad KD, Migo VP, Alfafara CG, de la Peña FO, Miranda RO, Albaladejo JD, Nadala Jr ECB, Loh PC, Tapay LM. 2000. Prevalence of white spot syndrome virus (WSSV) in cultured *Penaeus monodon* in the Philippines. Dis. Aquat. Org. 42:77-82
16. Natividad KDT, Magbanua FO, Migo VP, Alfafara CG, Albaladejo JD, Nadala Jr ECB, Loh PC, Tapay LM. 2002. Prevalence of yellow-head virus in cultured black tiger shrimp (*Penaeus monodon* Fabricus) from selected shrimp farms in the Philippines. *In*: Lavilla-Pitogo CR and Cruz-Lacierda ER (eds) Diseases in Asian Aquaculture IV. Fish Health Section, Asian Fisheries Society, Manila Philippines. p. 45-55
17. de la Peña LD, Lavilla-Pitogo CR, Namikoshi A, Nishizawa T, Inui Y, Muroga K. 2003. Mortality in pond-cultured shrimp *Penaeus monodon* in the Philippines associated with *Vibrio harveyi* and white spot syndrome virus. Fish Pathol. 38: 59-61

c. Training and Training Needs

There are two agencies that conduct fish disease training in the Philippines. SEADEC Aquaculture Department conducts training for local and international participants such as AquaHealth Online, an internet-based training, and hands-on training for important viruses affecting fish and shrimp. BFAR conducts trainings for Fish Health Officers and Fishery Quarantine Inspectors, as well as private participants.

The Fish Health Staff of BFAR has availed of training programs on quarantine, fish disease diagnosis, and surveillance developed by the International Development Council (IDRC) of Canada, Network of Aquaculture Centers in Asia-Pacific (NACA), Food and Agriculture Organization of the United Nations (FAO), Aquatic Animal Health Research Institute (AAHRI), and the Southeast Asian Fisheries Development Center (SEAFDEC). Likewise, the Fisheries Quarantine Officers at NAIA have availed of the training programs developed by BFAR-Fish Health Section, SEAFDEC, NACA and FAO.

With increasing risks of spread of transboundary pathogens and diseases, there is a need to enhance the diagnostic capability for TSV, KHV, and other important diseases for the Fish Health Officers in the laboratory and for the Fishery Quarantine Officers at ports of entry.

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