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TABLE OF CONTENTS

Acknowledgements ........................................................................................................... 7
The 7th IFOMC International Steering Committee ............................................................ 8
Executive Summary ........................................................................................................... 9
Conference Session Summary ........................................................................................ 10
Opening Session ................................................................................................................ 20
  • Oscar Guzmán - Conference Chairman ........................................................................ 20
  • Wladimir Espinoza - Municipal Communications Director, Viña del Mar Chile ........ 21
  • José Luis Blanco - ex-Executive Director ................................................................... 21
  • Maximiliano Alarma – Head of Fisheries Administration Division, SUBPESCA ............ 22

SESSIONS AND WORKSHOPS

Sessions .............................................................................................................................. 23
Workshops ........................................................................................................................ 118
Posters ............................................................................................................................. 134
Closing Session ................................................................................................................. 176
Overview of the 7th IFOMC according to Evaluation Form ............................................... 184
Countries present at the 7th IFOMC ................................................................................. 188
Sponsors ............................................................................................................................ 189
Appendices ....................................................................................................................... 190
  • International Observer Bill of Rights ....................................................................... 191
  • Commonly Used Abbreviations ................................................................................. 196
  • Delegate List .............................................................................................................. 200
  • Sponsors & Supporters Contact List ......................................................................... 204

SESSIONS AND WORKSHOPS

Session 1

How to balance cost effectiveness of data quality in fisheries monitoring programs? .............. 23
  • Optimal coverage planning for fresh fleet of argentinian hake (merluccius hubbis) with observers on board for the year 2013 ...................................................................................... 23
  • New methodological advances in developing a plan to optimize fishing fleet coverage with observers on board ........................................................................................................... 25
  • A field test of an observer-audit approach to improve catch reporting in Alaska ............ 26
  • The benefits of the high initial investment in quality sampling equipment resulting in long term savings and higher quality data ................................................................. 26
Proceedings of the 7th International Fisheries Observer and Monitoring Conference

- Guiding principles for design of fishery monitoring programs.......................................................... 27

Session 2

Can industry data be used for monitoring rights-based fisheries, seafood traceability and/or fisheries certification? ........................................................................................................................................ 28
- Evolution of industry observer programme in support of evidence based management .................. 28
- Comparing two Dutch self-sampling programmes for discard monitoring in terms of establishing a successful collaboration between fishermen and scientists ........................................... 29
- An observer program for Indonesian longline fleets ........................................................................... 30
- Electric fishing for flatfish in the north sea: pulse trawling ............................................................... 30
- Effects of MSC fisheries certification on the implementation of observer programs ......................... 31
- This fish: an example of industry designed innovation in seafood traceability .................................. 31

Session 3a

What are the future trends in fisheries monitoring programs? .............................................................. 33
- Fisheries monitoring roadmap: a guide to evaluate, design and implement an effective monitoring program .................................................................................................................................... 33
- Monitoring in U.S. Fisheries - 2013 and beyond ................................................................................ 34
- Electronic monitoring - a tool to provide full documentation in a catch quota management system .... 35
- Comparing the costs of onboard observers and remote electronic monitoring (REM): a Scottish case study .................................................................................................................................. 39
- An electronic monitoring project in the northeastern United States .................................................... 42
- A pilot study of an electronic monitoring system on tropical tuna purse seine fishery ...................... 43
- Evaluation of electronic monitoring as a tool to quantify catch in a multispecies reef fish fishery ......... 44

Session 3b

What are the future trends in fisheries monitoring programs? .............................................................. 46
- On board fisheries observer program: “logbook”: towards the ecosystem-based approach in Perú .... 46
- Fisheries and Oceans Canada’s electronic networks: agents of change to improve commercial and recreational fishery management information ............................................................................. 50
- Affordable handheld devices for fisheries observer programs ............................................................ 52
- Automatic assessment of total retained fish catch using stereoscopic cameras (3D) ......................... 54
- Electronic monitoring technology in the Southeastern United States commercial reef fish and shrimp fisheries ..................................................................................................................................... 54
- Evaluating accessibility and standardization across U.S. fisheries observer programs .................. 56

Session 4

How do programs observe and monitor artisanal fisheries? ................................................................. 58
- Observers of the voluntary program of the artisanal fisheries in the eastern Pacific Ocean: agents of change ..................................................................................................................................... 58
- Methodological issues to estimate catch and fishing effort of small-scale fisheries by sampling fishing trips on-site .......................................................................................................................... 60
- A pilot study for observing catch of the USVI small boat fleet ............................................................ 63
- Benthoric fisheries monitoring system in Chile: achievements and limitations .............................................. 63
- Monitoring in the management and exploitation areas for benthic resources in Chile ........................................ 64
- Challenges for scientific observers collecting data for benthic artisanal fisheries in tubul, Bio Bio region, Chile ................................................................. 65

Session 5

How best to monitor recreational and pay-for-hire (charter) fisheries............................................................... 67
- Using multiple data sources to monitor recreational fisheries on the pacific coast of Canada ..................... 67
- Assessment of the biological impact of the recreational fishing in three non-managed sites along the north-western french mediterranean coast .................................................................................. 69
- Comparison of Pamlico sound and coastal atlantic ocean striped bass, morone saxatilis, recreational angling success .................................................................................................................. 71
- Management and assessment implications from a lack of data on discards in recreational fisheries for pacific halibut ......................................................................................................................... 71
- Monitoring artisanal fisheries in the basque country: (skippers involvement and participation in the data collection process) ......................................................................................................... 73
- Advantages and limitations of telephone surveys for monitoring artisanal fisheries ........................................... 74

Session 6

Reducing risk in a high risk job .............................................................................................................................. 77
- The role of rfmo observer programs in promoting vessel safety in high seas fisheries (areas beyond national jurisdiction) ...................................................................................................................... 77
- Establishment of monitoring under precarious conditions in extreme areas: challenges for scientific observers ........................................................................................................................................ 77
- Observer safety training across USA observer programs ....................................................................................... 77
- Examining the items that compose a vessel safety checklist and applications for international observer programs ........................................................................................................................ 78

Session 7

How to determine and reduce bias in monitoring programs? .............................................................................. 80
- Types of biases that affect marine monitoring programs and practical solutions to control bias .................... 80
- Does observer coverage of specific vessels affect bycatch analysis? ................................................................. 81
- Estimation and consequences of bias and overdispersion resulting from deployment and observer effect. 82
- Methods for eliminating catch sampling and vessel fishing behavior bias in the gulf of mexico and southeastern atlantic fisheries .................................................................................................. 84
- Reducing bias, protocol in the gulf of Mexico reef fishery .................................................................................... 85
- A protocol for data exploration to rapidly identify bias in at-sea observer or self-sampling programs ........... 87
- Simulating the impacts of alternative observer deployments in Alaska .......................................................... 87

Session 8

Fisheries enforcement role in compliance with international treaties relative to resource sustainability ...... 88
- Compliance use of observer data ................................................................................................................... 88
- The evidentary value of observer programs in prosecuting offences .............................................................. 90
Program integrity: mechanisms to ensure the integrity of the Canadian observer ........................................ 90
Impact of regulation on scientific observer’s data collection in fisheries development institute – Chile ....... 91
Implementation of the discards at sea law in Chile ...................................................................................... 93

Session 9
What are the future trends of transshipment observer programs? .............................................................. 96
- Status and trends of the tuna RFMO transshipment observer programmes ............................................. 96
- Shark conservation trends in the Pacific and their effects on the IATTC transshipment observer program .... 97
- (dis)Harmony among tuna transshipment observer programmes (ttops) - the at-sea observer’s perspective ........................................................................................................... 97
- Observers without borders, the cross-endorsement of tuna purse seine observers in the Pacific Ocean ... 101

Session 10
How can fishery monitoring programs support an ecosystem approach to fisheries management?. 102
- A case study: does the implementation of the Northwest Fisheries Science Center observer program support an ecosystem-based approach to fisheries management? ........................................ 102
- The role of scientific observer data in underpinning ecosystem based fisheries management in CCAMLR .... 105
- Azores fisheries observer program: gathering data for ecosystem based management ......................... 105
- Importance of the population, environmental and fishing effort variability in the application of the MSC-CSIRO PSA on an industrial fishery like the Argentinean hoki fishery ........................................ 108
- Selective or less selective: what can observer data tell us about fishing pressures on marine communities from the Southern Bay of Biscay? ........................................................................ 110
- An ecosystem and risk-based approach for assessing and identifying levels of fisheries monitoring programs on Canada’s Pacific Coast ........................................................................... 112

Session 11
New and emerging Observer Programs ...................................................................................................... 115
- Competencies required by scientific observers deployed onboard commercial fishing vessels in Chile .... 115
- Observer training to meet contemporary demands in the Northeast Atlantic ........................................... 115
- The observer program and its role in monitoring and conservation: a new type of fisherman ............... 116
- New phase of Korean observer program ................................................................................................ 117
- All hands on deck! Implementing an emergency observer program in response to the Deep Water Horizon oil spill .............................................................................................................. 117

WORKSHOPS
7th International Fisheries Observer & Monitoring Conference Workshops ............................................... 118

Data quality workshop (DQW) .................................................................................................................. 118
- International principles and quality indicators for fisheries dependent data ........................................... 118
- Impact of real-time computer assisted logbook on anchovy fisheries data management ....................... 119
- Using observer data and satellite monitoring to improve estimates of fishing effort .............................. 121
- Scientific observer data management and quality assurance at CCAMLR ............................................. 123
• Quality management system ISO 9001, as a tool to improve data quality management and fisheries observers programs. Case study: Results six years under operation in IFOP................................. 124
• Knowledge, skills, and abilities of scientific observers to collect quality data: A challenging and multifaceted job.................................................................................................................. 125

Observer professionalism workshop (OPW).......................................................................................................................... 127
• Observer Professionalism Themes ........................................................................................................................................... 126
• Isolating variables that contribute to increased observer retention .......................................................................................... 128
• The vulnerability of observers working as “at will” contracted employees ............................................................................. 129
• Educating crew members: The observer role ............................................................................................................................. 130
• What is the relationship between observer experience and data quality? .................................................................................. 131
• Establishing a collaborative network linking fisheries observers with agency/institutional scientists ............. 132
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The 7th IFOMC International Steering Committee

The Steering Committee was instrumental to the success of the 2013 conference. As pictured below, the members are (left to right):

Francisco Plaza | Conference Coordinator, IFOP - Chile
Howard McElderry | Archipelago Marine Research Ltd., Canada
Greg Workman | Fisheries and Oceans, Canada
Andrew France | Ministry for Primary Industries, New Zealand
Oscar Guzmán | Instituto de Fomento Pesquero, Chile. Conference Chairman
Teresa Turk | NOAA/NMFS Affiliate, USA
Dennis Hansford | NOAA/NMFS, USA
Lisa Borges | FISHFIX, Belgium
Amy Van Atten | NOAA/NMFS, USA

Not in picture:
Luis Cocas | Undersecretariat for fisheries and Aquaculture, Chile.
John Kelly | NOAA/NMFS, USA.
John LaFargue | NOAA/NMFS, USA.
James Nance | NOAA/NMFS, USA.
Charles Grey | NSW Primary Industries Science and Research, Australia.
John Chouinard | Fisheries and Oceans, Canada
Executive Summary

The 7th International Fisheries Observer & Monitoring Conference took place in Viña del Mar Chile on April 8-12, 2013. It convened 27 countries and more than 250 participants. This meeting, as in the past, was able to make space for discussion, sharing of knowledge and most important reunite old, new and future Scientific Observers, researchers, government entities, industrial, and institutional representatives. The primary objectives of this meeting were as follows:

- To develop, promote and enhance effective fishery monitoring programs and use of technologies to ensure sustainable resource management throughout the world’s oceans.

- To improve fishery monitoring programs worldwide through sharing of best practices and development of new methods of data collection and analysis.

- To provide a forum for dialog between those responsible for monitoring fisheries and those who rely upon the data they collect.

The conference consisted of 12 Session Themes ranging from topics such as “New and Emerging Observer programs” to “Monitoring of Artisanal fisheries”. Three workshops: Data Quality, Observer Professionalism and Observer Bill of Rights Workshops.

The Conference’s International character caught much interest amongst government entities and local authorities. Speeches from Head of Fisheries Administrative Division Maximiliano Alarma, Fisheries Development Institute Executive Director José Luis Blanco, Municipal Communications Director Wladimir Espinoza in Representation of Viña del Mar’s mayor and Chairman Oscar Guzman were held at the Official Opening Ceremony.

During the course of the week, panelists discussed current trends and issues affecting observer professionalism allowing a constant interaction between panelist, session leaders and spectators.

Delegates also participated in artistic events, cultural activities, and social spaces geared to global and regional networking and alliance building. The conference finalized with closing remarks from Gabriel Blanco, Lisa Manarangi-Trott, Omar Yañez and Chairman Oscar Guzman.
Conference Session Summary

Session 1: How to balance cost effectiveness of data quality in fisheries monitoring programs?
This session was focused on exploring successful applications of cost saving strategies to maximize the effectiveness of fisheries monitoring programs. In a world of limited budgets and increasing demands for monitoring, what approaches have programs taken to get the “biggest bang for their buck”. Strategies to prioritize critical needs over less essential ones, focusing on objectives, fine-tuning equipment, and developing alternative systems need to be continually performed and evaluated. This session had five talks by four speakers from four observer programs around the world offering some of their recent lessons learned to target an optimal yield of monitoring resources. We heard from Gabriel Blanco, Craig Faunce, Eric Brasseur, and Bob Trumble, led by Amy Martins (formerly Amy Van Atten).

Gabriel Blanco from the National Institute of Fisheries Research and Development (INIDEF) in Argentina kicked off the session with a talk on a software system, “OPTIMOBS v3”, designed to optimize the use of observers through quantitative planning. With 520,000 square nautical miles and 700 different types of fishing trips, this presents a challenging landscape for fisheries management and this program is applied to help develop a coverage plan based on previous years’ fisheries data. This tool has proven helpful in decision making for the program and has helped to optimize observer coverage. Gabriel also reported on using a Monte Carlo Simulation to help inform how many observers would be needed to provide adequate distribution of coverage in a stratified fishing fleet. This further helps to inform the optimum application of observers for particular fishery characteristics.

Craig Faunce, with the National Marine Fisheries Service, from the Alaska Fisheries Science Center, talked about applying an audit approach to improve catch reporting in Alaska. Using ratio-estimators to generate landings estimates, he reported on a comparison between observer reports and industry’s in an effort to improve the overall quality of the catch accounting of three fisheries in the Gulf of Alaska. He suggests that observer data can be used to audit the self reports. He tested the quality of the observer data as well and found that on occasion rare catches may not be detected and species identification may present some problems. He highlighted that by using shore-based observers, in addition to at-sea observers, has utility in improving species identification on landing reports, thereby improving the overall catch accounting particularly under multispecies complexes.

Eric Brasseur, with the National Marine Fisheries Service, with the West Coast Groundfish Observer Program presented data on cost benefits of investing in quality sampling equipment for observers, resulting in higher quality data and long term savings. Their program has invested in purchasing a more costly scale, but the value it brings to collecting better quality information on weights of fish at-sea is worth the investment. In the evaluation of new equipment, the safety of observers was also evaluated, and the long term durability in the field. His field study demonstrated that the addition of the motion calibrated platform scale increased accuracy, reliability, efficiency, and observer safety.

Bob Trumble presented some suggestions of guiding principles in designing fishery monitoring programs. These were organized into eight inter-related categories, highlighting the importance of getting stake holder engagement and support, understanding the specific fishery fleet characteristics, establishing clear goals and objectives of the monitoring program, making enforcement considerations, and developing monitoring strategies. By developing and clearly articulating these in advance of deploying a monitoring program, a more effective and efficient program will evolve. MRAG Americas convened two panels with experienced program managers and they put these best practices, or guiding principles, in a document to help guide developing programs, and serve as important reminders and considerations for existing monitoring programs.

In summary, this session had some good examples and shared innovative ideas of how to polish, improve, evaluate, and perfect the management of monitoring programs. These examples included documented principals, developing software for optimizing deployments, adjusting sampling strategies, and investing in appropriate tools for success. These are all efforts to balance the costs and resources with measured improvements in data quality. We don’t want cuts in budgets, or increasing demands for more coverage with less resources, to degrade the quality of data or the
Session 2: Can industry data be used for monitoring rights-based fisheries, seafood traceability and/or fisheries certification?

The fishing industry is becoming increasingly proactive in the management and monitoring of its activity, resulting from the need to increase accountability pushed by non-governmental organizations but also by consumers. Industry run programs can be cheaper and more efficient, giving at the same time the industry empowerment to be more engaged and cooperative. The objective of this session was to give an overview of different industry monitoring program that were used or started because of management, seafood traceability or fisheries certification needs.

A wide diversity of papers were presented, addressing the several topics asked for, from industry owned and run observers programme to self-sampling and reference fleets, and their connection to research-based programmes, but also the importance of market forces to incentive monitoring programmes through sustainability certifications and supply chain traceability projects. The session attracted speakers from three continents: Asia, Europe, America (North and South); and included representatives from several stakeholders groups: non-governmental organizations, industry and researchers.

Following the presentations several topics were discussed, ranging from the reasons behind industry lead programmes, such as permission to fish in specific areas, with distinct gears or for different species, but also the need to demonstrate different sustainability requirements. Questions such as how to ensure industry data quality and verification, how transparent and accessible are industry data to the general public, or how data may change with different legal requirements were discussed, among other issues. It was generally agreed that there is an important role for the industry to play in monitoring programmes. The answer to the initial question “can industry data be used for monitoring rights-based fisheries, seafood traceability and/or fisheries certification?” was an unequivocal yes.

Session 3a: What are the future trends in fisheries monitoring programs?

Trusted, timely, and accurate catch information is critical for maintaining sustainable fisheries, but this is often difficult and costly to obtain. For many fleets, observer-based monitoring programs may be too expensive, impractical, or logistically complex. As a consequence, there is interest in exploring technology based approaches to monitor fisheries, based on the notion that this may be a more cost effective and practical option. Electronic Monitoring, an automated array of closed circuit television cameras and sensors, has been tested in a variety of fisheries across multiple jurisdictions, geographies, gear types, catch and monitoring objectives. Many of these studies show promise, yet after over a decade very few fisheries have adopted technology-based monitoring, suggesting that there are challenges in getting traction with this approach. The purpose of this session is to examine different test cases to better understand implementation issues and lessons learned. It was emphasized that EM should not be considered as a replacement for observers, but rather to serve as an additional means of collecting data. Observers will always be needed in some capacity, such as collecting biological specimens and detailed catch sampling.

As a preface to the presentations, the session lead provided an overview of EM technology, summarizing the elements that would likely be in common with any EM program. Firstly, there is an onboard monitoring system consisting of a control center, to record data, connected to an array of video cameras, gear sensors (e.g., winch, hydraulic pressure), and a GPS receiver. The entire system is then powered through the vessel’s AC or DC power. The system runs automatically when activated, mapping the cruise track, logging fishing times and locations, monitoring winches, pumps and lifts, and creating a video record of all key fishing operations. Secondly, data analysis software is needed to help summarize and review the large quantity of data recorded by the EM system. The analysis tool is used to efficiently review, evaluate, and report on fishing activity. This tool integrates thousands of video, sensor, and GPS records into a single synchronized profile, so reviewers can quickly review trip cruise tracks, verify gear deployment and retrieval times and locations, and verify catch events. Key fishery data can then be recorded in a standard database format for easy reference, analysis, or downstream processing. Finally, surrounding the technology is an operational framework that includes clearly defined fleet and vessel monitoring plans to ensure the technology is deployed successfully, field service infrastructure to manage the EM equipment deployed, data analysis services to interpret, integrate and report EM data, as well as other service elements to ensure the program is efficient, effective, and integrated with fishery agency needs.
There were seven panel presentations covering a range of topics related to planning, implementation and testing of technology-based monitoring. The presentation by Ms. McTee provided a planning tool for thoughtful assessment of monitoring needs and selecting of the appropriate monitoring tool. Mr. Rilling provided an interesting perspective on US fisheries agencies as they move to improve their fishery dependent data systems and consider how EM could play a role. Mr. Dalskov summarized the Danish experiences with EM and a fully documented fishery program that has been deployed since 2008 in the North Sea. Based on a large multiyear Scottish EM program, Ms. Dinsdale developed a cost model for use in comparing EM with observer programs. Mr. Chamberlain (presented by Ms. Van Atten) reviewed their progress with an EM trial in the US northeast multispecies groundfish fishery. Mr. Chavance (presented by Mr. Ruiz) presented results from high seas Indian and Atlantic Ocean trials on large pelagic tuna seiners, while a small vessel application was presented by Mr. Baker, with results from the US southeast snapper fishery.

The presentations and follow on discussion provided a range of perspectives on the use of EM to monitor commercial fisheries. Clearly, EM is not a ‘plug and play’ replacement for observer programs and technology-based systems are complex, time consuming to implement, and required greater crew cooperation for success. Even the most optimistic scenarios of EM deployment in a fishery could still require observers to fulfill some of the more detailed data collection needs. However, there were several examples provided of ways EM could be deployed in an effective manner. The potential cost savings from technology based monitoring provide a compelling case to continue examining potential applications.

Session 3b: What are the future trends in fisheries monitoring programs?
In the United States, when one mentions electronic monitoring (EM) thoughts lock onto video. However, EM can include other electronic technologies such as electronic logbooks (E-Logs), handheld devices for data entry, and data collection software. To that point we have heard how in Peru, the use of an onboard electronic logbook, Logbook t, collects fishing effort data consistent with an ecosystem based approach to resource monitoring.

As a compliment to Peru’s efforts of using electronic technology to monitor fisheries, we have heard how Fisheries and Oceans Canada (DFO) has successfully deployed E-Logs since 2005 in a variety of fisheries, gillnet, trawl, pot, and hook and line. Using satellite modems, smartphones, or local area networks, data can be transmitted in near real time, if necessary. Programming in HTML 5 has made it easier to use this application on smartphones. This innovation makes it easier for the recreational fishers to report their catch information and adds another option to observers on recreational boats to collect data. It has also led to reductions in costs and errors associated with transfer of hand written paper logbook data. Additionally, DFO’s First Nations (FN) has access rights to fisheries above those of commercial and recreational fishers. We have also heard how DFO has developed a Regional Food, Social, and Ceremonial (FSC) Standalone Database, which is designed to use FN fisheries programs to assist in the management of FSC catch data, fish requests, and distribution to members. The system interfaces seamlessly with DFO’s corporate database thereby providing an effective standardized method to manage FSC catch data.

The United States Shark Bottom Longline Observer Program wanted to improve data collection. Using handheld computers, they designed data entry applications for observer to record and edit gear, haul and catch information that could be transferred via Wi-Fi hotspots. Use of the tablet and the IP67 case are cost effective. This is realized by the reduced number of hours required during post trip data transfer, making this paperless data collection method very attractive and feasible on a national level.

Possibly the most intriguing attempt to assess the total retained fish in a codend is being achieved by the several companies using a technology based on geological and geotechnical mapping called Sirovision. This approach could create accurate 3D images of total volume and once enhanced with image analysis algorithms could potentially identify individual fish and estimate their size. Acquiring these images coupled to GPS to georeference the data onboard with vessel specific data, e.g., vessel id, date, latitude, longitude, and total volume which could then be transmitted to a centralized database with minimal personal or infrastructure.

It should be noted that while we are all in agreement that the need for high quality data that is more readily available and cost effective to collect and transmit is a shared goal. It is further noted that we recognize observers as our eyes and ears into the fishing world. The application of the various electronic technologies shared here are intended as means to augment at-sea data collection methods, i.e., observers, and by no means as a replacement, this is a sentiment shared by everyone on this dais.
**Session 4: How do programs observe and monitor artisanal fisheries?**

This session focused on the main problems related to the monitoring of artisanal fisheries and management areas. In the first presentation, authors agreed that the difficulties of artisanal fisheries monitoring rely mainly on the diversity of fishing systems and gears, measures of sampling effort, wide geographical distribution of fishing effort, size and operation of each boat and most important crew skills. They all add up to a high amount of variables difficult to manage.

The presentation by Liliana Rendon "Observers of the voluntary program of the artisanal fisheries in the Eastern Pacific Ocean: Agents of change" mentions the development of a monitoring pilot study. The author agrees that it is possible to implement a monitoring system to artisanal fisheries but depends on its long-term financing.

Chile’s artisanal fisheries monitoring plan as described in Nancy Barahona’s presentation, has been operating for a long period of time, however it’s limitations rely mostly on achieving precise numbers to standardize the fishing effort. Crew competencies and the observers’ skills are also key to a correct performance of the data system.

Robert Trumble’s "A pilot study for observing Usvi catch of the small boat fleet" mentions an alternative data collection system applied when financial, space, and safety considerations for placing observers on board are limitations to data collection. Therefore, the pilot study focuses on sampling fishing landings. Establishing this type of program will depend on the level of bias.

Managing marine coastal protected areas (TURF) face similar issues. Baseline studies are carried out by consultant enterprises, who then determine commercial catch quotas for resource exploitation. So again, we rely on the reliability of third party. The presentation by Luis Ariz shows that there are errors in the spatial location of the areas boundaries, and sampling units, caused by not using standard protocols for spatial data sampling (misuse or unreported datum).

There is the need to seek for methods to reduce these sources of error. One option is raised by Mr. Lima-Green with his proposal "New Statistical Method of Monitoring Artisanal Fisheries in Brazil" which proposes a three-phase method for monitoring artisanal fisheries. Unfortunately he could not participate in this conference but certainly can be a contribution for future sampling programs.

**Session 5: How best to monitor recreational and pay-for-hire (charter) fisheries.**

Commercial fisheries have a long history of being monitored and observed and this has led to the successful management of fish stocks and fisheries in many parts of the world. Recreational fisheries on the other hand, do not have such a strong history of being monitored, particularly in marine waters. There are of course exceptions to this statement, such as in North American freshwater lakes and rivers. It is now acknowledged that recreational fisheries are a significant component of the catch and take of many stocks in many regions of world and that recreational fisheries do indeed have an impact on world fisheries take.

Recreational fisheries are very lucrative in many areas, they often attract large numbers of participants and they are increasing in many areas. Recreational fisheries require rigorous monitoring and there is potentially an important role for fisheries observers to participate in this monitoring requirement.

This was the first introduction into this particular forum of a session focused on the monitoring of recreational fisheries.

In particular, this session aimed to investigate:

- How best to monitor and observe recreational fisheries
- How to incorporate with monitoring of commercial fisheries in shared stocks
- The impact that charter or head boats can have and the most effective means to gather the required information from these fleets.
- Develop methodologies to deploy observers into recreational fisheries

Worldwide, recreational fishing involves large numbers of people and is one of the most frequent leisure activities. Some success in gathering information has been achieved in some areas, primarily through interviewing fishery participants or having them complete surveys. The questions which were posed to fishers needed to be carefully worded to avoid bias to the survey respondents’ feedback. With the increase in accessibility and adoption of internet based systems fishers are able to report their information via the web and there is a potential for more focus to be
directed in this area. All presenters during this session spoke of the difficulties associated with collecting the data and information required. The information need is there and over time we should see an increase in new and novel ways being trialed to collect the data needed.

**Session 6: Reducing risk in a high risk job.**

We see many of the same safety concerns and issues worldwide; unsafe vessels, lack of support, harassment, and a need for better safety training. We often think that our problems are unique, but many times other programs are facing similar issues and have come up with effective ways to approach them. This panel explored how RFMO’s, observer programs, and observers themselves can mitigate some of these problems.

Our first presentation discussed how observers are in a unique position to gather information for fishery management organizations. Not only do they collect biological data used in fishery management, but they can collect information on safety standards and safety incidents. This information can be used to reduce the number of accidents and increase the safety for our fishing fleets worldwide.

The next presentation focused on an observer program in a remote area of Chile highlighting the difficulties, risks and safety concerns. Observer programs operating in remote areas often are the first and only source of data collected for these fisheries. Communication and information transfer between observer programs is increasingly more important with so many remote, small scale observer programs starting up around the world.

A talk on US observer safety trainings revealed many similarities and some differences. There is an emphasis for consistently between the trainings but with regional variations to address local safety concerns. Most agree that having national standards for safety training has many benefits. Among these are increase consistency, the possibility for observers to move between programs without added safety training, and a higher level of training.

A look at one program’s safety checklist showed us a variety of required safety equipment as well as information that should be asked to increase an observer’s safety. While no one safety checklist can fill the needs for all observer programs, all observer programs can benefit from having a pre-trip safety checklist. It was suggested that programs in need of a safety checklist review other program’s checklists and glean what they can or modify to meet their needs.

The IFOMC is one of the few forums where observer trainers and managers from around the world can interact face to face. It is an opportunity to see what other observer programs are doing to reduce risk, increase safety and what can be incorporated into our own programs.

**Session 7: How to determine and reduce bias in monitoring programs?**

Bias can play a major role in observer monitoring programs and can drastically skew the reliability of scientific data. There are many types of inherent biases pertaining to marine fisheries data collection and analysis. This session discussed several examples of sampling or analysis bias and what procedures or methodologies can be employed to minimize them. Examples of potential sources of bias from observer programs include: vessel selection, catch sampling, changes in fishing behavior when an observer is or is not on board, and analysis techniques employed in the estimation of catch and bycatch. A diversity of papers were presented by authors from the U.S. National Marine Fisheries Service; Fisheries and Oceans, Canada, Université de Moncton, Moncton, New Brunswick; IAP World Services, and IMARES, Netherlands.

The first paper identified 3 types of bias that are related to observer data collection; mental and emotional bias, motivational and social bias. These types of bias can reduce objectivity throughout data collection and emergency situations. Solutions presented to reduce these forms of bias included random sampling in measuring of the catch, random vessel selection, the use of logbooks in debriefing, and annual safety drills. In another presentation, statistical analysis of landings and observer data noted observer data is likely to be unreliable for catch characteristics of commercially important species, but there is evidence that this may not be the case for some commercially unimportant species. Bias associated with the priorities given to observers and how well they can manage only so many tasks was also discussed in another presentation. Solutions were discussed during question and answer periods that included structural changes to observer programs that remove incentives for observer effects, creating disincentives and removing adverse opportunities.
Two papers presented bias associated with vessel selection. One paper suggested that continued selection of fishing vessels that had inexperienced Captains could unnecessarily influence the subsequent analysis of bycatch estimates. While most observer programs do not record information relative to the captain or crew’s experience or fishing technique, results from this study suggest this data should be incorporated into future data collection protocols. Another presentation discussed a randomized deployment strategy that could potentially negate the possibility for observer data bias due to non-representative deployment in previous unobserved fisheries. The final two papers in the session examined simulation studies to evaluate how well observers on Dutch demersal beam trawlers collected data and the other on how haphazard monitoring of the Alaska groundfish fisheries can introduce harvesting bias. Both studies found bias but identified factors to reduce future effects in the associated programs.

Session 8: Fisheries law enforcement roles in domestic and international waters

The at sea observer program are used to collect technical, biological and scientific data. They are also used to collect all data related to the fishing activity (compliance monitoring). In some countries, at sea observers collect only biological and scientific data.

We are still faced with two schools of thought. Scientists do not want observers collecting data on compliance monitoring because this can influence the fishermen’s behavior. Fishery monitoring experts, however, are entirely opposed to this approach and are requiring that biological data be collected at the same time as data on compliance monitoring.

For some time now countries have been forced to considerably decrease and adjust their means of surveillance at sea because of their increasingly precarious financial situations. Fishery managers are facing a considerable challenge: balancing the various tools that allow them to monitor fishing activities adequately.

Session 8 shed light on the increasingly important and necessary role that observers aboard fishing boats play in new initiatives, namely eco-certification and traceability. Both of these initiatives require governments in charge of fisheries to clearly show that they have effective tools in place to monitor fishing activities on a daily basis. The moment the fish are caught must be monitored, which requires observers to be on board fishing boats. These programs were implemented to put fish caught legally on the market, in accordance with the various regulations.

Having observers aboard fishing boats is a very effective way to identify illegal, unreported and unregulated (IUU) fishing within countries' exclusive fishing areas.

In the Canadian presentation on maintaining the integrity of the at sea observer program, the criteria adopted to avoid conflicts of interest between fishers, observers and at sea observer companies were identified. The Canadian objective is to have an observer program in place that provides reliable, integrated data on fishing activities. This data is used for both monitoring compliance with regulations and fishing plans and collecting biological and scientific data for stock assessments.

Mechanisms have also been put in place to audit at sea observers' work as well as that of companies responsible for delivering these programs.

New Zealand demonstrated that when observers are on board, fishers are better at recording compliance and fisheries information. Reviewing catch data from boats without observers compared to those with observers, the levels of non-compliance related to preparing reports and recording data on fishing activities is much greater when no observers are on board. Through compliance monitoring by observers, boats can be identified that are discarding and selecting large fish at sea because of catch limits they must comply with when they land. In some cases, up to 30% of unreported small fish catches were estimated using the data collected by observers.

The use of observer data for legal purposes must be rigorously controlled. Firstly, the Court must agree that the data can be admitted as evidence. Secondly, the credibility of observers must be debated in court. Thirdly, there is high turnover rate for observers, and sometimes it is difficult to locate them once they have left their job. In spite of this, during session 8 a few examples were given where observer data was used in court to sentence fishers.
During session 8, details were also presented on legislative measures adopted in Chile on recruitment, aid, at sea observers, and how they are treated on fishing boats and in processing plants. Since those regulations have been in force, changes have been noted in the quality and integrity of observer data.

Participants showed greater interest in the presentation on new measures within the Chilean law on discards. Numerous questions were asked about this new law, which did not seem to be overly accepted by harvesting industry representatives.

**Session 9: What are the future trends of transshipment observer programs?**

The first tuna transshipment observer program (TTOP) was established in 2007 by the International Convention for the Conservation of Atlantic tuna (ICCAT) to monitor transshipments between large scale longline vessels and ICCAT authorized tuna transport container vessels for 4 member countries. The goal of the TTOP was to record the transfer of tuna from the fishing vessel to the container vessel and ensure that no product laundering occurred. While globally most observer programs have a scientific basic or core to their scope of work, the TTOP program was established solely as an enforcement or monitoring program. Quickly thereafter the establishment of ICCAT TTOP program, other RFMOs including the Inter-American Tropical Tuna Commission (IATTC), Commission for the Conservation of Southern Bluefin Tuna (CCSBT), and Indian Ocean Tuna Commission (IOTC) initiated similar transshipment observer programs. Recently the Western and Central Pacific Fisheries Commission (WCPFC) has also adopted a transshipment observer program.

The purpose of the session was to discuss similarities and differences between these spatially large global transshipment observer programs, identify areas that could be improved either across programs or individual programs and converse on whether these programs can collect good useable scientific data instead of only compliance information in the future.

Mr. Nugent provided a good historical review of the development of the various TTOP programs and the types of data they collect. Currently MRAG Ltd, Capfish and MRAG Americas are the providers of observers to ICCAT, IOTC, IATTC, and CCSBT. Because these companies are in partnership with each other, they share training materials and cross train observers in ICCAT, IOTC, and CCSBT. The cross training reduces training and administrative hiring costs as well as improving the efficiency of leaving TTOP observers on board the transport vessel once the vessel crosses into a new management area and accepts product. Mr. Nugent suggested improvements could be realized through greater integration of the IATTC and WCPFC programs.

Mr. Belay presented recent updates on the greater monitoring and data collection on the transshipment of sharks in the IATTC program. IATTC and other regional fisheries management organizations (RFMOs) are beginning to expand their information gathering requirements on bycaught species and their disposition such as shark fins.

Ms. Dietrich and the Association for Professional Observers (APO) created a survey directed at former and current TTOP observers that queried the observers on a variety of issues including hiring eligibility, criteria, and training length. Areas that need improvement are inconsistencies among programs on how data is collected (independently by the observers vs. data that is provided to them), length of observer deployment (8-10 months in one TTOP program), observers need safe and clean drinking water to be provided to them, and standardized protocols for identifying and recording vessel characteristics. The APO’s study also provided many recommendations on where data could be collected consistently using the same protocols and forms across programs.

Mr. Altamirano discussed the similar data collection requirements for vessels that fish for tuna in both of the IATTC and WCPFC convention areas. The data requirements and associated protocols are determined by each of the RFMO organizations. There is one significant difference in data gathering requirements between the two programs. In the IATTC Eastern Pacific Ocean it is common practice to set on schools of dolphins that are associated with tuna. However this same practice does not exist in the WCPFC. The IATTC and WCPFC are in discussion about ways to harmonize currently data collection practices so that both RFMOs can extend data analysis across RFMO boundaries.

In summary, all of the presenters emphasized the need for greater data and protocol harmonization and cross training of observers. Standardizing protocols and creating standardized training materials, and data collection fields will allow researchers and managers to analyze tuna product and bycatch movement on a global scale to combat illegal fishing
and improve tuna management. Other aspect of the TTOP that could be improved include harmonizing hiring eligibility, payment practices, and length of observer deployments.

Session 10: How can Fishery Monitoring programs support an Ecosystem Based Approach to Fisheries Management?
Over the last two decades government agencies tasked with managing fisheries have struggled with implementing an Ecosystem Based approach to Fisheries Management (EBFM) or rather a holistic and all-encompassing view of the resource extraction activity and its impacts. EBFM requires responsible agencies to not only collect information on landed catch of target species but also the composition and quantity of by-catch and discarded catch, habitat impacts and encounters with endangered, threatened or protected (ETP) species. Fisheries observers have been employed as the primary tool for collecting this information, observers allow agencies to collect high precision species specific data, both temporally and spatially throughout a fishing season resulting in incredibly rich data which provide insights into the biology, seasonal movements and life history of species vulnerable to the fishing gear as well as insights into fleet dynamics and fisher behavior.

The panelists for this session have covered a broad range of topics. Alex Perry discussed recent changes to the fisheries management system on the west coast of the USA and the adoption of Individual Fishing Quotas (IFQs) and 100% observer coverage as a mean of gathering the data required for analysts to provide ecosystem based harvest advice to resource managers and policy makers. Eric Appleyard discussed the pivotal role at sea observers play in collecting not only fishery data but also fishery ecosystem impacts data in Commission on the Conservation of Antarctic Marine Living Resources (CCAMLR) convention area. Both of our first presenters discussed the need for information on fishery impacts on target and related species and emphasized the importance of at sea observers in gathering information on the gear configuration (including measures to reduce incidental mortality of seabirds and marine mammals), fishing operations, catch composition, biological data on target species including tag/recapture data and data on non-target catches including fish, seabirds, marine mammals and vulnerable marine ecosystems (VME) indicator taxa. Miguel Machete presented an overview of several projects in the Azores wherein observer data is used to verify fishing activities, evaluate fishing practices or generate estimates of total catch for several non-target species. These studies emphasized the scientific role at sea observers often play blurring the line between the observer as an enforcement entity and the observer as a sea-going scientist while further re-enforcing the need for, and utility of, objective, unbiased at sea observations of fishing activities. Our fourth speaker, Morales-Yokobori, presented a Productivity/Sensitivity analysis that relied exclusively of Fisher logs contrasting the level of overlap between the fishing fleet and the species distribution for both target and non-target species demonstrating the utility of mandatory fleet wide Fisher logs (Fishing reports) for informing analyses across large geographic and temporal scales. Laurence Fauconnet explored the question of how fishing gear selectivity, across a range of gear types, results in different ecosystem level impacts in the Bay of Biscay. This is one of the few studies making full use of the detailed information collected by at sea observers be generating metrics of species richness and evenness from catch composition data and size selectivity from the length composition data. The final speaker, Carol Eros, presented a risk based frame work for determining appropriate levels and types of fishery monitoring based on the perceived levels of risk to ecosystem components (species, community or habitat). The framework affords a consistent and transparent approach to developing fishery monitoring programs in Canada’s Pacific Region fostering greater confidence amongst stakeholders and the general public.

In jurisdictions with long standing fishery monitoring programs data collected by observers is increasingly being mined by analysts for insights into changes in ecosystem structure and function not only in response to fishing pressure but also in response changing climatic conditions. While many observer programs had their genesis as regulatory measures the information these programs have gathered over the decades is now proving invaluable in trying to assess the consequence of anthropogenic activities on marine ecosystems.

Session 11: New and Emerging observer programs
There is no doubt that the critical condition of many fisheries around the world have resulted in a higher demand for finer data and information, needed to properly administrate the fishing resources and its environment. In addition, Governments have shown a growing interest in managing their fishing resources sustainably using an ecosystem approach, which involves taking into consideration a series of data not collected in the past, including discards, incidental catch, impact of oil spills, etc.
Through experiences presented at the 7th IFOMC, we have seen that Chile and the other participating countries are not the exception to this trend. However, in most places the availability of research vessels is both limited and expensive, making it necessary to incorporate fishing vessels and fisheries observers to the task of collecting the bulk of the information. Yet, the constrained conditions challenge to work and live aboard these vessels, and call for skilled observers, capable of performing a variety of tasks while maintaining good communications with the crews. This scenario makes indispensable to rely on appropriate training programs aimed to provide observers with knowledge and adequate tools. In addition, it has been recognized that it is essential to introduce changes in regulations as well, guaranteeing better and safer working conditions for observers.

As a result new and emerging observer programs are being implemented worldwide. An example illustrating the international commitment to improve fisheries management and conservation through observers is the South Korean National Observer Program, operated since 2004 by the National Fisheries Research and Development Institute (NFRDI). This program had accomplished high standard monitoring for ICCAT, CCAMLR, WCPFC, SEAFO, SPRFMO, and SIOFA, and has been continuously improved by the Government which has recently launched the Institute for International Fisheries Cooperation (IFIFC). At present, both agencies work collaboratively; NFRDI providing scientific support, and IFIFC dealing with administrative issues. In addition, the Government plans to amend the Ocean Industry Development Act, advancing toward a world-class level Program.

As said previously, observer programs have become versatile, taking significance in monitoring not only fishing activities but other marine economical activities that may impact the environment as well. Such is the case of the implementation of an emergency observer program as a response to the deep water horizon oil spill in the Gulf of Mexico in 2010. This incident demanded a quick reaction to monitor and recover specimens impacted. Once again, observers proved to be a great source of information. Nevertheless, setting a program under these conditions was a challenge in terms of training, safety, and logistics, which need to be considered for future experiences.

Also immerse in this global context of new requirements for information from areas of marine economic development (fishing, offshore oil and gas seabed resources, marine renewable energies, and tourism) we knew the case of Galway-Mayo Institute of Technology and the Strategic Alliance for Research and Training, who developed and provided accredited training for industry personnel and graduate students to collect data from all those commercial platforms. The training included shiptime, laboratory, and lectures supported by online resources providing trainees with the skills to collect data for variety local and foreign agencies.

Along with new data requirements we have seen changes in fishing regulations; shifting from the dependence on vessel owners’ will to allow observers onboard, to more compulsory requirements. A clear example is the Chilean Regulations on Observers, first launched in 2006, and currently being improved through amendments in the Fisheries Act. In absence of appropriate regulations before 2006, the system relied strongly on fishermen involvement, which was accomplished through education provided to them by the observers. The monitoring of swordfish in Chile is an example of cooperative effort, showing the relevance of providing information to fishermen, who are now committed to conservation. This experience was the base to further develop the observer program under the new rules.

The 7th IFOMC corroborated the importance of having well implemented observer programs in order to achieve the complex task of managing fisheries worldwide and securing its sustainability. It was reach a consensus regarding the essential role played by fisheries observers within this approach, and it was also agreed the need to standardize these programs, improving training, working conditions, job stability, safety, independence and data quality.

The human component is transcendental and must be also considered. However, since observers work independently, and spend little time with each other, currently it has been limited exchange of experiences. Through OBSERVE THIS!, a unique and entertaining audiovisual initiative presented by a NOAA/NMFS observer, we have seen that unconventional tools may be of big help to illustrate these experiences, share valuable information, and above all, contribute to maintain positive working relations with fishermen. In addition, OBSERVE THIS! shows topics applicable universally, therefore may serve to promote professionalism and international exchange of experiences between observers worldwide.

As management systems evolve, observer programs must also adapt. In the U.S West Coast, where the limited entry trawl fleet was rationalized to a Catch Share system, the transition to an Individual Fishing Quota required the
implementation of a 100% observer coverage at sea and for landings, while maintaining coverage levels in a variety of other fisheries observed by the both the West Coast Groundfish (WCGOP) and Hake (A-SHOP) Programs. These new requirements impacted observer priorities, data timelines and other science objectives, as well as the workloads. The transition also involved challenges in terms of safety while achieving 100% coverage and finding cost-effective alternatives such as EM. These kinds of efforts require a collaborative work with other agencies, fisheries groups, programs and stakeholders.

A well-documented example showing how cooperative efforts can lead to accomplish transcendental scientific research for management and conservation, in a cost effective way, is the assessment of post-release survival of striped and Pacific blue marlin by the Pacific Islands Regional Observer Program since 2010. The otherwise cost-prohibitive estimations of mortality, derived from logistic, experimental designs, amounts of samples, and material required for pop-up satellite archival tags, was remedied through a cooperative approach, which included the use of a cost effective biochemical technique, and well trained observers, directly linked to the researchers.
Opening Session

The opening ceremony of the 7th IFOMC took place on the evening of Monday, April 8, 2013 in Hotel O’Higgins plenary room. The Opening Session included welcoming speeches from Chairman - Oscar Guzman, Municipal communications Director - Wladimir Espinoza, Head of Fisheries Administrative Division SUBPESCA - Maximiliano Alarma, IFOP Executive director – José Luis Blanco and Senator Antonio Horvath.

Welcoming Remarks from Chairman Oscar Guzmán.

On behalf of the Scientific Committee I would like to welcome you to the seventh edition of this conference. No doubt it's an honor for us to have a large presence of observer monitoring program organizations, members of Chilean government, NGO's, academics and other stakeholders that despite the great distance have made every effort to be here. This not only highlights the importance of these meetings, but also gives us the assurance that we are on the right path towards an improvement of observer and monitoring programs worldwide.

I wanted to take the time to introduce the Scientific Committee. Please welcome our members from the United States, Teresa Turk, Dennis Hansford, Amy Van Atten, John LaFargue and John Carlson. From Canada, Howard McElderry, Greg Workman and John Choinard. From Portugal, Lisa Borges. From New Zealand, Andrew France. I would also like to introduce you to Mr. Luis Cocos, our Chilean representative in the Scientific Committee

In the last couple of years we have developed a program for the 7th IFOMC, continuous to the main aims of past meetings, highlighting and emphasizing on the development of innovative methods to monitor our fisheries and how to globally promote the use of these.

The conference is setup of 12 sessions. Oral presentations will be held at our main conference room and posters will be permanently located at the Esmeralda Hall. Two very important workshops will also take place at our main conference room O’Higgins.

No doubt that during this week, we'll have room for discussion, sharing of new experiences and have a closer view of the different observer programs around the world.
Welcoming remarks from Wladimir Espinoza – Municipal Communications Director, Viña del Mar, Chile.

I am pleased to give you all a warm welcome and thank you on behalf of the Mayor of our city Mrs. Virginia Reginato, for choosing Chile, especially Viña del Mar, to host the Seventh International Fisheries Observer & Monitoring Conference.

The IFOMC is being held for the first time in Latin America and has the participation of over 180 delegates from 27 countries. The first version was hosted in 1998 in Seattle, United States, and later on in countries like Canada and Australia.

A special recognition goes to the Fisheries Development Institute for hosting this important event of global significance, which seeks to create a solid foundation of knowledge for countries to manage their natural resources towards a sustainable development of fisheries.

As a coastal city that coexists directly with the sea, we hope that this conference can be a great contribution to continue with the goals set in the industry, providing its participants with the knowledge and necessary tools to ensure the sustainable management of the world's oceans natural resources.

In parallel, we invite attendees from this important conference to discover and enjoy the benefits of our city. Our tourism, historical attractions and spectacular surroundings makes us the epicenter of Chile.

Welcoming Remarks from José Luis Blanco – IFOP Executive Director

I have the honor to welcome you on behalf of the Fisheries Development Institute to the 7th International Fisheries Observer and Monitoring Conference. I am particularly proud that you chose Chile as the host of your meeting and hope that you find here the necessary conditions for a profitable work.

During the next few days, you will be devoted to a problem of great importance for the future of fisheries. Our world's oceans are at high risk, the high level of resource exploitation is causing a negative global effect. Within the general framework of sustainability of fisheries, protection of endangered species is a major task.

Fisheries Observer Programs are one of the main tools for acquiring first-hand scientific information in fisheries research. Fisheries Observer Programs are considered, along with satellite tracking systems for vessels and fishing research surveys, key tools for achieving sustainable management of fisheries resources.

Undoubtedly, this Conference deemed necessary to review, among other things, the functions and activities of the Fisheries Observer programs already positioned on our globe as well as strengthening developing programs.

Ladies and Gentlemen, I thank you as well as all the international organizations represented here, for the hard work and your dedication dispensed inexhaustibly in the cause of protecting our future.

I wish you a pleasant stay in Viña del Mar.
Welcoming Remarks from Maximiliano Alarma – Head of Fisheries Administrative Division. Undersecretariat for fisheries and Aquaculture, Chile.

First of all I would like to extend to you the warm greetings sent by our Under Secretary for Fisheries and Aquaculture, Pablo Galilea Carrillo, both to the Fisheries Development Institute, organizer and host of this event, as to all delegates from the 27 countries with us today in the 7th International Fisheries Observer & Monitoring Conference.

For the Under Secretary of Fisheries and Aquaculture, it is an honor and a great opportunity that our country is hosting the first IFOMC held in Latin America, mainly because we find ourselves at a historic moment in the management of our fisheries, corresponding to the implementation of the new Fisheries and Aquaculture Law enacted on February this year. This law has radically changed the prevailing scenario, incorporating the precautionary principle and focusing on ensuring the sustainability of fishery resources and establishing scientific criteria for over all other considerations when making management decisions and management.

Another example which plots the change is the new law that defines and regulates discard, which requires us to study this practice, quantify, identify the causes of discards, know where it happens and in what fisheries is it more relevant to finally establish a Reduction Plan. All information on discarding Research Program will be collected by scientific observers deployed throughout the country in selected fisheries.

Also, the new Fisheries Act has given IFOP the custody and administration of all databases generated in research activities and monitoring of fisheries and aquaculture. To gather the information at a single institution, demonstrably capable of so much work will certainly help us in fulfilling our task.

Chile has the great challenge of recovering their fisheries and it is therefore essential to have reliable data on what actually happens on board industrial vessels, in fish processing plants and artisanal fisheries. Quality data are the basis of modern fisheries management. If the information contains errors it will introduce uncertainty in the scientific advisory which will then lead to a misdiagnosis in the state of the resource, and therefore not allow for good decision making in fisheries management.

The common feature observed in countries that have successfully addressed and resolved the problems associated with fisheries management, is that they have monitoring programs and scientific observation of wide coverage and high standards, which ensures the representativeness of the data. The international experiences that we collect on this matter will help achieve the goals we have set.

As I mentioned above, new fishing regulations require a major role to be played by the Scientific Observers. The regulations recognize that the best source of information on fishing activities and what actually happens in the sea comes from observers, and in that sense it has sought to ensure that safe working conditions comply with appropriate standards and ensure a good performance of observers’ duties.

Needless to say and appreciating the great efforts that many of you have made to come to this distant corner of the planet, I say goodbye, wishing that your stay is pleasant and that we can work together for the sustainability of the oceans.