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## Chilean and Peruvian researchers meet at the workshop “Standardization of the protocol for estimating the biomass of the southern Peru-northern Chile anchovy by hydroacoustic methods”

At IFOP Valparaíso, from August 5 to 9, professionals from the Peruvian Sea Institute (IMARPE) and the Fisheries Development Institute (IFOP) held the workshop “Standardization of the protocol for estimating the biomass of the southern Peru-northern Chile anchovy by hydroacoustic methods” inserted in the GEF/UNDP/SUBPESCA/PRODUCE project “Catalyzing the Implementation of a Strategic Action Program for the Sustainable Management of Shared Living Marine Resources in the Humboldt Current System. GEF ID: #9592, known as the Humboldt II project.



The objective of the workshop was to agree on a standardized protocol that will serve as a guide for estimating biomass using hydroacoustic methods for the shared stock of anchovy in southern Peru and northern Chile.

Jorge Castillo, researcher and IFOP focal point, explained “this workshop is part of the objectives of the Direct Assessments GTB considered within the Scientific and Technical Subcommittee (SCCT) of the Humboldt II project that seeks to estimate the shared anchovy stock in southern Peru and northern Chile (SCA-SPNCH). The result of these measurements should be an input to the stock assessment models, so they are coordinated with the results of the other GTBs. Specifically, the workshop seeks to establish two standardized protocols.





- Collection of acoustic, biological and environmental data.
- Definition of the required parameters and biomass estimation methods.

For this purpose, the following factors were analyzed: cruise periods, acoustic equipment, echo sounder frequencies, data collection strategies, species recognition methods, and collection of biological data using fishing gear.

In addition, the methodologies for estimating anchovy abundance/biomass applied in each country were analyzed and comparative analyses were performed. For this purpose, each country provided and shared a set of data in order to apply the corresponding methodologies.”

The expected result of the Workshop was to have a protocol for collecting the data required for estimating biomass, hopefully standardized, and if not possible, to determine the conversion factors. A second expected result was to have a draft protocol for estimating biomass, standardized or with the necessary conversion factors to refer to the results and obtain the size of the shared stock. This draft protocol will be finalized during the year 2024.

Gonzalo Pereira Puchy, Executive Director of IFOP, said: “For IFOP, it is very gratifying to have hosted this workshop, which is part of the activities of the Humboldt II project, which we carry out jointly with the Peruvian Sea Institute. The workshop is part of one of the components of the project and has to do with one of the main fisheries in northern Chile and southern Peru, which is the anchovy. For us it has an additional importance, since this reactivates a long relationship of cooperation that IFOP and IMARPE have had in these 60 years of history”

Dr. Pedro Castillo Valderrama, General Director of hydroacoustic research, remote advice and fishing gear of IMARPE-Peru referred to

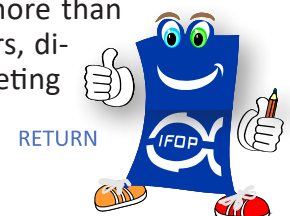
the workshop “I am very happy to meet friends and colleagues with whom we have worked several times. We are trying to standardize a methodology and apply it to resources that are common such as anchovy, which is of interest to our institutions, IMARPE and IFOP”.

Dr. Daniel Grados Paredes, a direct evaluation researcher from IMARPE, said, “I am very pleased to be part of the binational workshop to develop standardized methodologies to evaluate anchovy, which is a shared resource. The workshop was very fruitful, as we are reaching agreements that will lead us to guarantee the sustainability of the resources shared between Peru and Chile. We are meeting with colleagues in person, with whom we are enriching and strengthening the ties between IMARPE and IFOP.”

## Women in artisanal fishing meet to exchange experiences

La Serena, Coquimbo, August 8, 2024 – With the aim of promoting the empowerment, visibility and appreciation of the roles played by women throughout the artisanal fishing chain, the GEF/UNDP SUBPESCA/Vice Ministry of Fisheries and Aquaculture Humboldt II Project, an initiative carried out by the Undersecretariat of Fisheries and Aquaculture of Chile and the Ministry of Production of Peru and implemented by the United Nations Development Program (UNDP), organized the Meeting of Women in Artisanal Fishing and Related Activities of Coquimbo-Chile. The National Fisheries and Aquaculture Service (SERNAPESCA), the National Institute for the Sustainable Development of Artisanal Fishing and Small-Scale Aquaculture (INDESPA), and the Fisheries Development Institute (IFOP) participate in this important binational initiative.

The event was attended by more than 60 women, seaweed collectors, divers, shellfish gatherers, filleting







women, marketers, among other activities, from the coves of San Pedro, Puerto Aldea, Tongoy, Los Vilos, La Sierra and Chungungo.

During the activity, leaders and representatives of the associations gave presentations on their experiences, challenges and achievements in fishing activity, where they also highlighted the importance of recognizing and supporting the crucial role that women play in artisanal fishing and their contribution to the sustainable development of coastal communities.

In addition to local experiences, the meeting had the valuable participation of representatives and specialists from the fishing institutions, who shared the progress that, from their respective institutions, is being made to incorporate the gender approach and the empowerment of women in artisanal fishing.

During his presentation, Javier Chávez, SUBPESCA zonal director for Atacama and Coquimbo, highlighted the legislative and strategic advances in the Chilean fishing sector, underlining the importance of equity in its multiple dimensions: gender, territorial and intergenerational. In particular, he emphasized the integration of women in governance spaces and the importance of the Regional Women's Roundtables as a fundamental tool to address gender gaps in the sector, allowing for more equitable and effective participation in decision-making.

Cecilia Solís, regional director of Sernapesca, stressed that it is essential to make women's contribution visible and encourage their participation in leadership roles within the sector. In

many coves, although women actively participate, the leaders are still mostly men. We need more female leaders who represent the diverse and valuable perspectives that women bring to this activity," she said.

Gisela Iribarra, head of the Department of Artisanal Fishing, and Lisette Montesy, head of the Information Management and User Service Department of SERNAPESCA, presented the requirements to join the Registry of Related Activities (RAC). They highlighted that this registry, essential to make visible and recognize the work of people, mainly women, dedicated to activities complementary to fishing, already has more than 3,800 registrations nationwide. This progress reflects the commitment of the sector to improve working conditions and promote gender equality in artisanal fishing, complying with the provisions of Law No. 21,370.

In her speech, Nilse Rabet, representative of INDESPA, highlighted the need to identify the differences in the needs of men and women within the sector, in order to offer adapted responses that promote equity. In addition, she emphasized the importance of promoting the active participation of women and facilitating their access to programs and instruments for productive development and technical assistance. Key initiatives mentioned include the "Capital Semilla Emprendedora Artesanal" and "Capital Semilla Inicia" programs, which offer essential support for projects led by women in this sector.

From the perspective of women's contributions to fisheries research, Nancy Barahona, senior researcher at IFOP and member of the Benthic Scientific and Technical Committee, highlighted the female participation in the various instances of the current institutionality, such as scientific committees or management committees, highlighting that the new research vessel managed by IFOP bears the name of the distinguished researcher Mrs. María Angela Barbieri. It was also highlighted that one of the pilots and scientific operators on board this scientific vessel are women. However, although progress has been made, it is mentioned that it is necessary to expand the spaces for women's involvement in this area.

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The institute also collaborated with interesting dissemination material.

During the meeting, the attendees discussed the barriers they face to fully integrate into this sector, identifying challenges such as lack of access to resources, the invisibility of their work and the scarce representation in decision-making spaces. Based on these reflections, strategies were explored to strengthen the organization of women, as well as their training needs in relation to the activities they carry out.

This meeting is part of a series of events organized by the “Humboldt II” Project, to strengthen the knowledge and skills of women in artisanal fishing. Through these spaces, the aim is not only to enhance their empowerment and autonomy, but also to promote the creation of support networks and the exchange of experiences at the local and regional level between the two countries, key elements to face the challenges of the sector and move towards greater gender equality.

## Chile participates in international meeting on seabird bycatch

The twelfth meeting of the working group on seabird bycatch (SBWG12) of the **“Agreement on the Conservation of Albatrosses and Petrels (ACAP)”** was held in Lima from August 5 to 9, aimed at addressing current challenges related to seabird bycatch worldwide.

Among the main objectives of the meeting was the review of current ACAP indicators related to seabird bycatch and the presentation of new research. The workshop also explored alternative data sources and approaches to improve the accuracy and completeness of reports related to bycatch to ACAP.

Luis Adasme, IFOP researcher and official representative of Chile to the agreement mentioned “the work developed and presented by

Chile shows clear progress in its indicators during these last years, these achievements are the result of the effort and commitment of our fisheries institutions; Undersecretariat of Fisheries, Institute for Fisheries Development (IFOP) and National Fisheries Service (Sernapesca), as well as shipowners, crew members and fishermen, which has allowed us to advance, understand and find solutions to the challenges presented by the mitigation of incidental capture in fishing operations.”

The Agreement on the Conservation of Albatrosses and Petrels (ACAP) seeks, through its 13 Parts, to conserve albatrosses and petrels through the coordination of international activities with the aim of reducing threats to the populations of these seabirds.

The documentation of each of the meetings will be available on the ACAP website.

- Twelfth Meeting of the Working Group on Seabird Bycatch (SBWG12).
- Eighth Meeting of the Working Group on Population and Conservation Status (PaCSWG8).
- Fourteenth Meeting of the Advisory Committee (AC14)

Working documents and briefing papers for ACAP Working Group meetings and AC14 can be found via the links on the Upcoming Meetings and Events page on the ACAP website. However, please note that some documents are password protected, so only their summaries are publicly available.



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## Outstanding participation of IFOP in Latin American Congress of Marine Sciences

Between August 13 and 16, in Itajaí, State of Santa Catarina, Brazil, the 20th edition of the Latin American Congress of Marine Sciences (COLAC-MAR) was held. It is the most important technical-scientific event of Marine Sciences in Latin America. The professionals from the Fisheries Development Institute participated, Karen Belmar, Vladimir Murillo, Francisco Leiva, Fernando Espíndola and Heraldo Contreras.

### Summary of their presentations at the congress

#### *Karen Belmar*

The paper “Tagging of *Dosidicus gigas* in Chile: progress and challenges” presented the methodology and preliminary results of the tagging of cuttlefish in Coquimbo and Lebu. Horizontal and vertical movement of the specimens, characteristics of these movements. In addition, the advances in terms of protocols and operational difficulties were shown. The research is funded by the UNDP Project “Catalyzing the implementation of a Strategic Action Program for the Sustainable Management of Shared Living Marine Resources in the Humboldt Current System, Humboldt II Project”.

#### *Vladimir Murillo*



Within the framework of the study carried out by IFOP in the regions of Los Lagos, Aysén and Magallanes, environmental information was integrated from the Environmental Reports (INFA), which include sampling under the farming centers, and from the IFOP sampling campaigns, which cover sectors adjacent to these centers. The analysis, focused on the period 2012-2022, described the spatial behavior of the data organized by Salmonid Concession Group (ACS) and evaluated changes in the environmental conditions of the sedimentary bottoms based on the variables EhNHE, MOT and pH (i.e. categories “acceptable”, “transition” and “transition”). The results showed that the prevailing environmental conditions in each ACS have maintained their historical behavior, in accordance with previous studies. However, the EhNHE and pH variables presented greater spatial variability and a less favorable performance (i.e. “not acceptable” and “transition,” respectively), which is mainly reflected in the EhNHE of the INFA data.

#### *Francisco Leiva*

A presentation was made on the hydroacoustic evaluation of small pelagic fish. A review of the history and the main advances of the last 100 years was made. The technique and its basic principles were described, highlighting the importance of frequency selection, pulse selection, sampling design and the relationship of TS to size. Limitations in the studies were shown and finally a brief review of the work carried out by the Department of Direct Evaluations, at IFOP, Chile, was made.

#### *Fernando Espíndola*

The different stock assessment models that are applied for small pelagic fishes along the coast of Chile were described, highlighting the main differences and assumptions that are assumed for each of them, e.g. some stock assessment models incorporate fishery information on sizes and others on ages. In addition, the latest analyses developed for northern Chilean anchovy on the application of the Evaluation of Management Strategies (EEM) through the use of the openMSE software to evaluate the performance of the current and alternative fishery management procedures in achieving a set of objectives that are defined in the fis-







ery management plan for the Spanish anchovy and sardine fishery of the Arica and Parinacota, Tarapacá and Antofagasta Regions (Res. Ex. No. 1197, 2018) were presented.

### *Heraldo Contreras Cifuentes*

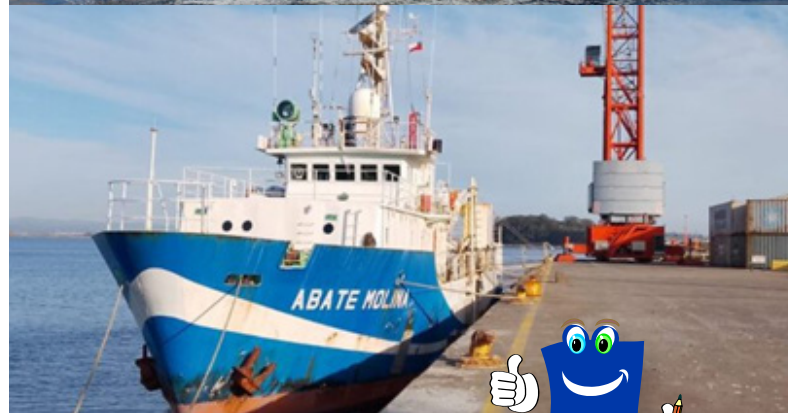
Information from hydrodynamic models developed by IFOP was integrated with the results of benthic sampling in the Compu and Quitrulco fjords. The relationship between the dynamics of water age and dissolved oxygen with the physical, chemical and biological characteristics of sediments was analyzed along a gradient from head to mouth in these fjords. The study revealed significant environmental gradients in water age and dissolved oxygen, as well as a close relationship between these variables and the benthic ecosystem. For example, it was observed that low circulation at the head of the fjords tends to accumulate organic matter, which negatively affects the community structure of the macroinfauna. These findings highlight the importance of integrating oceanographic dynamics into territorial management and salmon farming to ensure sustainable aquaculture development and the conservation of marine ecosystems.



## Chilean scientific vessels strengthen studies on anchovy, common sardine and Spanish sardine along the coast of Chile

THE B/I ABATE MOLINA SET SAIL TO EVALUATE THE CONDITION OF THE ANCHOVY BETWEEN VALPARAÍSO AND VALDIVIA WHILE THE B/I DRA. BARBIERI SETS SAIL TO ESTIMATE THE BIOMASS OF THE ANCHOVY BETWEEN THE REGIONS OF ATACAMA AND COQUIMBO.

The scientific vessel B/I Abate Molina set sail from the Port of Talcahuano on August 28, to carry out the sampling of the project “Evaluation of the spawning stock of anchovy and common sardine between the regions of Valparaíso and Los Lagos, year 2024” within the framework of the “Basic or permanent research program for the regulation of fishing and aquaculture developed by the IFOP within the framework of the ASIPA 2024-2025 Agreement, financed by the Undersecretariat of Economy.



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*Dr. Katty Donoso*

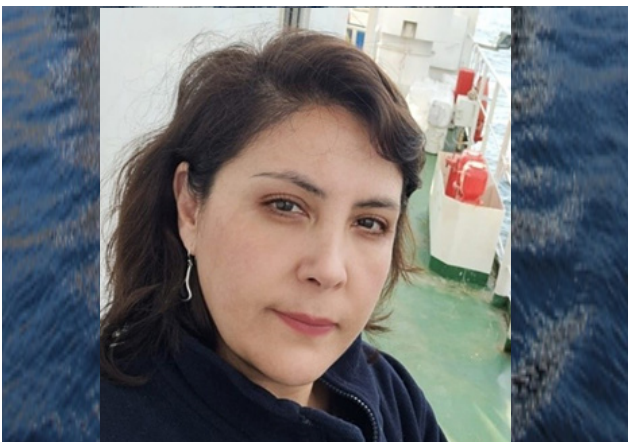


2024 is the second year that this cruise is carried out by IFOP professionals, with Dr. Katty Donoso as project manager and cruiser. The objective of this cruise is to evaluate the spawning stock of anchovy and common sardine, during the period of maximum reproductive activity and to evaluate the oceanographic conditions associated with this process in the area between the Valparaíso and Los Lagos regions. To do this, a sampling of eggs and adults of these resources will be carried out, together with the associated planktonic communities and a record of temperature, salinity, oxygen and fluorescence between the surface and 500 m depth.

This information will be used to estimate the biomass of the spawning stock, using the Daily Egg Production Method (MPDH), a method considered a fundamental tool for fishery management.

Together, environmental monitoring will allow us to put the Biopesqueros observations and results into context in order to analyze the influence of regional (ENOS) or local events on the distribution and abundance of these resources.

*Msc. Catherine Grendi Celedón*



On the other hand, and simultaneously on Friday, August 30, Dr. Barbieri will set sail from Valparaíso to the north of Chile, on the project of Msc. Catherine Grendi Celedón, in order to “Evaluate the spawning stock of anchovy during the period of maximum reproductive activity and the oceanographic conditions associated with this process in the area between the regions of Atacama and Coquimbo.”



This cruise marks a milestone in the 60 years of IFOP, since a new state-of-the-art scientific vessel is incorporated, which makes its first oceanographic cruise led by the head of the Oceanography section, the outstanding oceanographer Hernán Reyes, who is also part of the Department of Oceanography and Environment of the Fisheries Research Division of IFOP.

*Dr. Jessica Bonicelli*



These cruises will be joined from September 24 by the cruise corresponding to the project led by Dr. Jessica Bonicelli “Bio-Oceanographic Conditions and Evaluation of the Anchovy Spawning Stock between the Regions of Arica and Parinacota and Antofagasta, Year 2024” which will evaluate the national spawning biomass of the anchovy stock shared with Peru using simultaneously the B/I Abate Molina and the Dra. Barbieri.

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This cruise is especially important because it will evaluate the impacts of the last El Niño event on this stock. It will also be the national component of the joint cruise with Peru, Ecuador and Colombia that is carried out within the framework of the Permanent Commission of the South Pacific (CPPS) and will also be part of the coordinated efforts to monitor anchovy with Peru under the context of the GEF Humboldt 2 project.

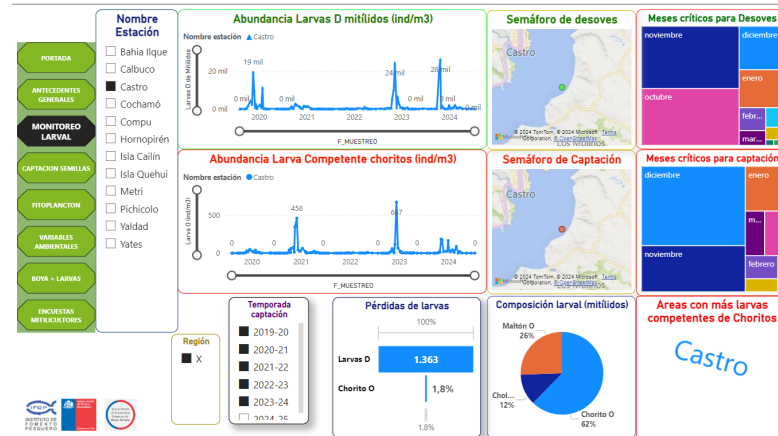
Dr. Letelier, head of DOMA, highlighted that three of DOMA's major projects are coordinated by top-level researchers at the national level, who will jointly evaluate the impacts of El Niño 2023/24 on the biomass of anchovy and common sardine between Arica and Valdivia. In addition, Dr. Letelier assured that the three cruises of 2024 will begin a new investigation of the effect of El Niño and climate change in the oceanic zone off the Valparaíso region, since they will permanently carry out a deep oceanographic station on the 800-meter depth edge each time they set sail, call at or pass over the slope in front of Valparaíso Bay. These types of measurements will allow a medium- and long-term evaluation of changes in the pelagic and demersal ecosystems of mid-latitudes in the great Humboldt current system. The data and results of this monitoring period, unique in Chile, will be deployed by the IFOP Climate Change Monitoring System (SAPO Chile – [sapo.ifop.cl](http://sapo.ifop.cl)).

## IFOP held a workshop on dissemination of larval monitoring and seed collection of mussels

The initiative was carried out online, between 9:30 and 12:30 on Wednesday, August 28.

On Wednesday, August 28, the Fisheries Development Institute (IFOP) held a workshop to

### Monitoreo larvas de mitílidos



disseminate the results of the “Monitoring and surveillance program on the larval availability of mussels for the sustainability of aquaculture activity in the southern zone of Chile, XI stage 2023-24”, a study that has been carried out since 2013 and is part of the permanent monitoring programs executed by IFOP and defined by the Undersecretariat of Fisheries and Aquaculture.

The workshop was held online through the Microsoft Teams platform. With more than 120 attendees, who expressed great interest in the different presentations. On this occasion we also had 2 presentations by both María Loreto Gaviño and Daisy Carreño who offered topics related to the Research Program such as a Characterization of mussel farming in Chile from the perspective of the Undersecretariat of Fisheries and Aquaculture. In turn, IFOP professionals associated with the monitoring program showed the main results of larval monitoring and presented presentations focused on describing the activity of collecting mussel seeds, inviting the audience to answer questions from the interactive platform “Endemic Seed” taking advantage of the changes and collaborations of other entities with relevant data such as that offered by the Millennium Institute in Coastal Socio-Ecology SECOS and other adjustments that also involve information of applicability from the Specific Objective of Surveys to the mussel farming sector, which can be perfectly linked to the other elements of the platform. This platform can be viewed by the community at: <https://www.ifop.cl/monitoreo-larvas-de-mitilidos/>.

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## Mussel farming; Chilean mussel aquaculture based on seed capture

Mussel farming in Chile has experienced remarkable growth in the last two decades, with mussel production increasing from 23,996 tons in 2000 to 386,037 tons in 2023. This boom has positioned Chile as the second largest producer and the world's leading exporter of mussels.

A crucial characteristic of this industry is its dependence on juvenile seeds and plankton from the natural environment. Capture-based aquaculture, which refers to the collection of seeds from the natural environment for cultivation and marketing, has particularities that require special management and regulation.

In this context, the mussel larvae monitoring program, established under the Permanent Research Program of the General Law of Fisheries and Aquaculture of Chile, has been fundamental. This program provides biological-environmental data essential to understanding the natural processes that contribute to the success of mussel farming. Furthermore, this information is expected to serve as a key tool for the management and regulation of seed capture.

Permanent monitoring not only helps to improve seed efficiency and quality by reducing losses and accompanying fauna, but also plays a crucial role in the conservation of natural resources and in the implementation of adaptive management plans. The literature recognizes the importance of these monitoring to answer key questions and support sustainable management of the activity.



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