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## IFOP participates in TVN's "Exploradores" program

In order for the country's authorities to have quality information in order to legislate around fishing and aquaculture activities and to promote their sustainable development, scientific research from north to south is carried out by IFOP.

To learn more about carried out work by its researchers, tomorrow, Wednesday, September 1st at 4:30 p.m. journalist Nicolás Vial will interview IFOP Director, Luis Parot, in a new chapter of "Exploradores", from the atom to the cosmos" broadcast by Canal 24 Horas, TVN.

Topics addressed in this chapter are:

### NEW TECHNOLOGIES TO MONITOR THE OCEAN

IFOP has been advising the State of Chile on fisheries matters for more than 50 years. Since the 1960s, the institute has carried out annual assessments of distribution and abundance of national fisheries resources, which is why it has been collecting information on marine populations evolution and their ecosystems for more than 50 years.

In order to continue learning about South Eastern Pacific Ocean, researchers are incorporating new



technological tools. In the monitoring area, one of the projects that they are developing in agreement with the FAO, consists of a technological platform development to monitor climatic change for long-term decision-making that at the same time provides daily satellite information and wind coastal artisanal fishermen between Ecuador and Antarctica.

In line with the development of numerical models, the team has modeling between Puerto Montt and Punta Arenas, at different scales, which allow us to know how water masses move, transported elements and the effects on the environment. The main results of these models can be found on the CHONOS web portal (<http://chonos.ifop.cl>).



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¿CÓMO DESARROLLAR UNA ACUICULTURA SOSTENIBLE?



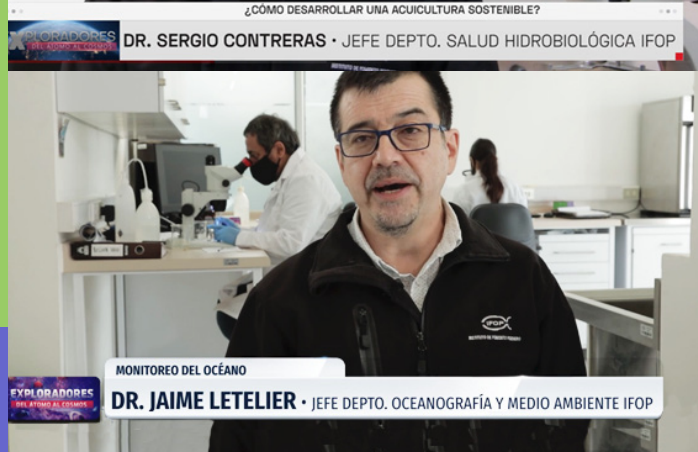
CONSERVACIÓN ECOSISTEMAS MARINOS

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¿CÓMO DESARROLLAR UNA ACUICULTURA SOSTENIBLE?

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## HOW TO DEVELOP A SUSTAINABLE AQUACULTURE?

Chile is the main aquaculture producer in America and 7th in the world. There is no doubt that aquaculture is a relevant industry in the country, mainly in southern area and that is why IFOP has several research lines on this topic. One of them is to know effects that this activity can generate on health and environmental issues.

In health matters, IFOP has the objective of safeguarding Chile's health heritage, through, for example, di-

seases that are not in the country surveillance, thus preventing their entry.

In addition to the large aquaculture industry, in a more emerging way in Chile the so-called small-scale aquaculture is also being developed with a view to seeing how this type of cultivation can be developed in the country. Carried out studies aim to find out what types of crops, where, how and who can grow them. It is also conducting analyzes around the effects that climatic change could have on them and, more incipiently, they have begun to work on the repopulation of macroalgae on the seabed, with this it is expected to generate a positive impact on the environment and incidentally contribute to crops development.

In another aspect, a phenomenon that affects both large and small-scale aquaculture as well as the fishery and at the same time public health, is harmful algae blooming, which is why IFOP is studying this issue. How they do it and what is the value of having this information is part of what we will learn about in the next chapter of Explorers.

## IFOP AND MARINE RESOURCES AND ECOSYSTEMS CONSERVATION

In order to generate information that allows regulating fishing activity and its sustainability over time, Sampling Management Department has 190 scientific observers throughout the country who collect biological and environmental information on both the large fishery and the fishery. handcrafted, a job that is done both at sea and on land. These data are stored and are what allow reports to be made so that both the Undersecretariat of Fisheries and SER-NAPESCA can fulfill their roles as creators of regulations and supervision, respectively.

Also concerned with ensuring the conservation of the highly migratory megafauna (sharks, cetaceans, turtles and different birds, among others) that inhabit the ocean, IFOP carries out different investigations/research. These investigations have a double purpose, on one hand, they seek to provide relevant information that allows mitigating these migratory species involuntary capture, which occurs during fishing processes, and at the same time has an ecosystemic approach, that is, it seeks to understand about these animals, interactions with other species, their habitat, displacement, among others. Also in the line of mitigating the effects of fishing on these species, they are conducting studies to test the use of marine conservation technologies. The application of mitigation mea-



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tures is relevant not only for the conservation of the species, but also for the fishing activity, since international markets, such as the United States, of great relevance for the country, are generating regulations to limit the export of marine resources that come from areas where fishing work causes the death of marine mammals.

## IFOP installs wave measurement buoy within its environmental conditions of salmon farming monitoring program

Among various efforts to understand the relationships between salmon aquaculture production and marine environment, within a sustainable development framework, in the coming years, concession

groups (ACS) must implement an online monitoring and control system of relevant environmental parameters (temperature, salinity, oxygen, etc.) to monitor salmon farming neighborhoods in southern Chile. Within this framework, IFOP is responsible for receiving, storing and processing information collected by monitoring stations. With the aim of advancing of environmental processes knowledge and their interactions with salmon farming industry, this network will allow large-scale data (big data) analysis and will have a website for results dissemination, in addition to establish an early warning system.

There are currently about 1,400 concessioned salmon farming centers, distributed along 1,500 kilometers between Puerto Montt and Punta Arenas. Each of these farming centers is administratively located within one of the nearly 90 neighborhoods or ACS (groups of salmonid concessions), which are joint management areas in logistics, production and bio-health issues.

The monitoring network contemplates at least 1 buoy for each neighborhood installation and considers oceanographic and meteorological variables measurement, such as water and air temperature, salinity, pressure, currents, wind, fluorescence, turbidity, dissolved oxygen, pH and precipitation.



As a first stage in results in storage system and display implementation, IFOP acquired and installed a wave observation buoy, corresponding to the Spotter model of SOFAR an American brand (<https://www.sofarocan.com/>), in the Castro fjord, near IFOP facilities in Putemún. This instrument will be used to calibrate system reception and to carry out tests on data transmission and storage system. In the medium term, all the environmental information collected and processed will be displayed through the

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BOYAS web tool within the CHONOS website (<http://chonos.ifop.cl/>), a platform that brings together a series of explorers, analyzes and data visualization based on information from numerical models developed by IFOP for Chilean Patagonia.

## IFOP Renews ISO 9001 Certification

ISO 9001/2000 Quality Management System (QMS) was implemented in IFOP from 2006 and certified for the first time in 2009. According to international regulations, QMS must renew its certification every 3 years. Therefore, in August of this year, Fisheries Development Institute recertified Quality Management System in accordance with the ISO 9001: 2015 Standard.

### WHAT IS ACHIEVED WITH CERTIFICATION?

By having a Certified Quality Management System (QMS), IFOP:

- It demonstrates that it has the ability to provide a consistent quality service, that satisfies its clients requirements and applicable legal requirements, and that
- It has necessary tools to increase customer satisfaction, through the effective application of its Quality Management System, including continuous improvement processes .

### WHAT DO WE CERTIFY FOR?

The Executive Directorate has decided to certify its institutional processes for biological fishery

data collection within ISO 9001/2015 standard framework:

- To consolidate IFOP's position in public institutions in knowledge generation and information on fishing and aquaculture.
- Improve the institution generated data quality by, supplied to national fisheries monitoring projects.
- Apply certified processes that guarantee quantity, timeliness, traceability and quality of the data collected in large quantities.



Moreover, IFOP need to have a Quality Management System (QMS) to achieve Data Management excellence, is a Regulation of Scientific Observers mandate that emanated from the General Fisheries and Aquaculture Law , in its Title III "Of the Administration of the System of Scientific Observers", Section d) indicates that: "the institution that takes this responsibility must accredit a certified management system, which ensures standardized and traceable procedures for collection, registration, transmission, validation and support of data and samples, in accordance with the scientific data collection protocols of the last 5 years ".

"DGM Sampling Management Department generated information is vital for the Institute to prepare scientific-technical studies and recommendations to advise Chilean State in decision-making; information that the Authority needs i order to exercise the mission of regulating and managing fishing and aquaculture activities, through policies, standards and ad-



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ministration measures, under a precautionary and ecosystemic approach that promotes hydrobiological resources conservation and sustainability for its productive sector development” explained Leonardo Caballero, head of the sampling management department.

## WHAT DO WE CERTIFY?

Collection, Reception, Entry, Validation, Storage and Protection of Fishery Biological Data of industrial and artisanal fisheries, developed in ports and on the resources indicated below:

Harbor	Fisheries	Species
Arica	Pelagic	Horse mackarel, anchovy and common sardines
Iquique	Demersal	
Coquimbo	Demersal crustaceans	Common hake
San Antonio		Shrimp yellow and red shrimp
Talcahuano		
Calbuco		Austral sardines

**PARTICIPATING:** The areas that participate in the Quality Management System are Executive Directorate, Fisheries Research Division and the Administration and Finance Division, represented by the Fisheries Assessment Department, the Sampling Management Department and the Support and Development Section. In support of the service are the Human Resources and Logistics and Infrastructure Departments.

There is also a group of ISO Internal Auditors made up of: Eliana Escudero, Sergio Elgueta, Sergio Mora, María Isabel Ruz, Bruno Biso and Rodrigo Leiva.

## Chile, Colombia, Ecuador and Peru carry out a joint oceanographic cruise in the Pacific Ocean in order to research El Niño phenomenon

IT IS AN INTERNATIONAL COMMITMENT COORDINATED BY SOUTH PACIFIC PERMANENT COMMISSION ([HTTP://CPPS-INT.ORG/](http://CPPS-INT.ORG/)). TO ASSESS EL NIÑO OR LA NIÑA PHENOMENON PRESENCE AS WELL AS ANOMALIES ON THE SOUTH AMERICAN COASTS THAT MAY AFFECT NATIONAL ECOSYSTEMS. THIS JOINT CRUISE HAS MORE THAN 15 YEARS OF HISTORY AND HAS DELIVERED ONE OF THE LARGEST COLLECTIONS OF CHILEAN OCEAN OCEANOGRAPHIC DATA VARIABILITY AND KNOWLEDGE

Between September 22nd and October 23rd, 2021, Chilean Fisheries Development Institute (IFOP) is conducting the cruise associated with the annual project “Bio-oceanographic conditions and evaluation of the spawning stock of anchovy between Arica and Parinacota and Antofagasta regions year 2021” which is part of the XXIV version of the Joint Regional Cruise, coordinated by the South Pacific Permanent Commission, where Colombia, Ecuador, Peru and Chile participate in a simultaneous and regional study effort for the study of the El Niño phenomenon, which has a new cold La Niña phase to begin in the coming months.

The national cruise will be developed within ASIPA 2021-2022 agreement framework and financed by Economy and Smaller Companies Undersecretariat. Therefore, IFOP will carry out prospecting cruises to obtain the samples and data necessary to develop the project according to the established methodologies.

The oceanographic egg and acoustic cruise is in charge of Hernán Reyes, Oceanographer and uses Abate Molina Ship as a scientific platform. A second ship is GAROTA III, which will carry out sampling of anchovy eggs in the area under Guillermo Galindo’s responsibility.

These cruises are part of the projects carried out by IFOP Oceanography

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and Environment Department ,Fisheries Research Division.

This project main objective is to evaluate anchovy spawning stock and to determinate oceanographic conditions during maximum reproductive activity period in the area between Arica and Parinacota, and Antofagasta regions. For this, a sampling of anchovy eggs and adults will be developed in the northern zone of Chile, information that will be used to estimate spawning stock biomass , through Daily Egg Production Method (MPDH). This method is considered a fundamental tool for anchovy fishery management in Chilean north .



Together, a monitoring of oceanographic and meteorological conditions will be developed. Which will serve to detect and evaluate environment impact on this resource, being able to serve for advice in decision-making and planning of fishing activity in the short, medium and long term. It is worth mentioning the participation of eight researchers, technologists and laboratory analysts who actively participate in this project execution.

## IFOP Librarian, is the new Marine Information Management Group president

On August 27th, via zoom, the Marine Information Management Group (GIM) annual meeting was held, attended by CONA executive secretary and librarians from: IFOP, Shoa, Natural History Museum, Sernageomín, Universities of Valparaíso, Austral , Concep-



ción, Santísima Concepción, Católica del Norte, Magallanes, Las Américas and Los Lagos.

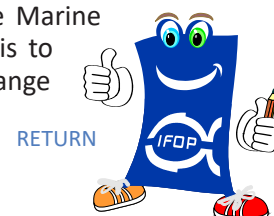
The GIM / CONA Working Group is a formal cooperation initiative between information professionals specialized in Marine and Aquaculture Sciences in Chile.

At the meeting, activities carried out in the 2020 period were discussed and the workshops to be held in 2021 were planned. In it, the IFOP Librarian, Ghislaine Barría González, was elected as the new president of the group.

Barría, referred to his position responsibilities which "are varied: representing the Information Management Group before CONA in events and plenaries, coordinating info-literacy workshops on technological tools, scientific databases, information search, creation of repositories and disseminate activities in support of researchers and teachers.

On the other hand, there is a responsibility with digital citizens, since education in digital and virtual environments management is essential, so that they learn to know what data they are looking for (numerical, visual, textual), how to recover them and where find them ".

"Leading the Marine Information Management Group, CONA is a challenge, since we are going through a paradigm shift, which began with open access to information, but the 21st century declares that open science implies that software must be open source and that the data must be of quality, this means that it can be interoperable and reusable. Faced with this scenario, to preside over the Marine Information Management Group is to get involved in the processes of change



based on the Open Access Policy to Scientific information and Research Data implemented by the National Research and Development Agency of Chile "concluded the Librarian by IFOP

## Intemit detects important advance of mussel spawning

IFOP VALIDATED IT BY A HISTORICAL RELONCAVÍ ESTUARY LARVAL ABUNDANCE

By gonadal analysis service virtue for spawning identification in catchment areas carried out by the Mitiliculture Technological Institute (Intemit), an important reproducers massive spawning was identified during August 2021 first days. This spawning identification in breeders occurred one month in advance with respect to 2020, which may affect seed uptake for the season that is beginning.

These spawning broodstock anticipated results identified by Intemit, were confirmed by the "Monitoring and surveillance program on larval availability of mitilids for sustainability of aquaculture activity in southern zone of Chile" of IFOP, where the analysis of The samples obtained at the beginning of August showed a historical abundance of almost 20,000 D larvae (spawning indicators), for each seawater cubic meter. These values are unheard of for the month of August, since spawning of this magnitude usually occurs from September onwards.

According to what the head of services and analyst for mussel gonadal monitoring, Camila Barría mentioned, "this is valuable information, since before starting this service, where broodstocks are sampled from catchment areas, mussels behavior was unknown. reproductive processes or this information was late. With mussels gonadal analysis, we can, in 24 hours, know samples status and be able to alert clients (mussel farmers) about spawning presence, anticipating catchment by at least one month".

According to Intemit's project manager, Cristian Segura, "predominant bio-oceanographic environmental factors, such as temperature or phytoplankton, stimulate or inhibit reproductive processes, advancing or delaying mussels spawning which in productive terms can significantly influence seed collection efficiency when collectors are not installed at the right times".

For his part, IFOP Larval Monitoring Program researcher, David Opazo, indicated that "in eight years of monitoring we had not registered a spawning of this magnitude in the month of August, and this time we evidenced it, not only in the Reloncaví Estuary (Yates sector, Los Lagos region), but also in Hualaihué (Pichicolo sector, Los Lagos region). This situation reinforces the idea that the natural supply of larvae for capturing mytilid seeds is highly variable and unpredictable".

Regarding this anomalous event causes, the IFOP researcher added that "a probable cause of phytoplankton are blooms occurrence (large sudden increases in the amount of phytoplankton) throughout this winter, which, in general, They begin to occur in early spring and are associated with large spawning of mussel larvae. There is also evidence that sea surface temperature was warmer this winter, compared to most winters in previous years."



Finally, with regard to the possible implications for mussel seed uptake activity, he pointed out that "we should see them in the coming weeks, when we know if the typical spring spawning that larvae provide for mussel seed uptake in period in which the greatest number of collectors are found in the water".

With this data, better decisions can be made regarding when the collectors are put in.

To know more about IFOP monitoring program larval larvae abundance reports, you can enter this link.

<https://ifop.maps.arcgis.com/home/index.html>

Information source Intemit

