



## IN THIS NUMBER

- Outstanding IFOP Presentations at Latin American Sustainable Artisanal Fishing Congress **1**
- IFisheries Development Institute inaugurates new headquarters in Iquique **3**
- IFOP participated in 2nd Viña del Mar Cultural and Citizen Book Fair **3**
- Ocean surface carbon data and synthesis observations workshops, held in Flanders, Belgium **5**
- In Japan, Fisheries Development Institute's Researchers participated in (ICHA 2023) harmful algal blooms main world conference **5**
- IFOP's scientific observer will collect information on cod in Antarctica **7**
- Working meetings between academics from Hiroshima University and Chilean Fisheries Development Institute researchers **8**
- Important harmful blooms and marine toxins international scientific conference will be held during October 2025, in Punta Arenas's city **8**
- IFOP researchers Nancy Barahona and Andrea Araya participate in a social protection for fishing and aquaculture sector workshop in Brazil **10**
- Intense flowering of *Alexandrium catenella* in Última Esperanza extreme north of Magallanes and Chilean Antarctica region province **11**
- IFOP organized carnival for sea turtles conservation in Arica **12**
- El Niño and Climatic Change Workshop Tarapacá Region's Risk Management and Mitigation of its Effects **12**
- IFOP of Chile and INIDEP from Argentina held a workshop on hoki within the framework of both institutions's existing cooperation agreement **13**
- Workshop to raise perceptions on Ecosystemic Approach implementation's associated gaps for Benthic Resources Management and Exploitation Areas regime decision making **14**



## Outstanding IFOP Presentations at Latin American Sustainable Artisanal Fishing Congress

The Latin American Sustainable Artisanal Fishing Congress, a commitment to the future, organized by CONAPACH, took place on December 12th and 13th, 2023 at Diego de Almagro Hotel, in Valparaíso city. On the occasion, it brought together more than 100 artisanal fishing leaders from Chile, Peru, Ecuador, Colombia, Panama, El Salvador and Costa Rica, NGOs and Foundations such as PEW and EDF. Also participating were Undersecretariat of Fisheries and Aquaculture, INDESPA and SER-NAPESCA main authorities, ECLAC and FAO national representatives, Defense Ministry, Foreign Affairs Ministry and MOP, Economy Minister Nicolás Grau, Antonia Orellana Guarcello, Women and Gender Equality Ministry, as well as deputies and senators from fisheries commissions of both chambers. At the inau-



guration of this event, IFOP's Director, Gonzalo Pereira, stressed the importance of considering climatic change in small-scale fishing and aquaculture d related decisions.

Among discussed topics, Fisheries Undersecretariat, Julio Salas announced that the



### Editorial committee

Gonzalo Pereira P. / Executive Director  
Gabriela Gutiérrez V. / Journalist

### Graphic design

Mario Recabal M. / Senior graphic designer

talking about the improvements that said regulation will require.

Artisanal fishermen from the Caribbean showed the problem of Lionfish's invasion in the Caribbean Sea, while national fishermen explained the complexity that the Sea Lion means to them. The need to raise local problems with national authorities through representative organizations, among which is the Latin American Union of Artisanal Fishermen.

In this context, Dr. Bryan Bularz Aguirre showed the conceptualization and a prototype experience of Ecosystemic's approach implementation within "Security of Maritime Miles for protection of marine ecosystems and development of small-scale fisheries through a Ecosystemic Approach" presentation framework

Dr. Jaime Letelier, Oceanography and Environment Department 's head (DOMA), also shared with participants in "El Niño Phenomenon and its implications in coastal communities" Presentation where the problem of El Niño 2023 and climatic change and how these affect and will affect artisanal fishing. These themes were consistent with Minister Grau's expressions, in which he calls for us to learn from this event and prepare for future environmental changes. This bidirectional knowledge instance transfer allowed actors to be shown Climatic Change Alert and Monitoring System developed by IFOP (S.A.P.O.) and that, coordinated by the Environmental Defense Fund (EDF), shares efforts with Instituto del Mar from Peru (IMARPE) and Public Aquaculture and Fisheries Research Institute (IPAP) from Ecuador.

The IFOP SAPO system is part of CORFO's Sustainable Productive Development Line (DPS) program called Strengthening IFOP Integrated Climatic Change Monitoring System: "Ocean Prediction, Observation and Visualization System (S.A.P.O.Chile) for resilient fisheries, ecosystems where aquaculture is developed, Management Areas and Marine Protected Areas under the context of climatic change." (<https://www.ifop.cl/red-de-monitoreo-cambio-climatico/>).

new Fisheries Law will be presented to National Congress in the last week of December, where issues associated with Climatic Change and El Niño event investigation will be addressed. This instance will be the first step to begin





## IFisheries Development Institute inaugurates new headquarters in Iquique

LOCATED AT OBISPO LABBÉ 991, IN IQUIQUE CITY. IN THE COMMUNITY'S COMMERCIAL AND SERVICE CENTER

Fisheries Development Institute inaugurated its new headquarters in Iquique, which will replace the old ones. The new IFOP home is a 2-story building, with a constructed area of 297.45 m<sup>2</sup>. (two floors) on a plot of 197.00 m<sup>2</sup>. On the 1st floor there is an access hall, 3 living rooms, 3 bathrooms, 2 warehouses plus a semi-covered parking area; On the 2nd floor it has a terrace, reception and secretarial area, wine cellar, kitchen, 2 bathrooms, 3 offices and a meeting room.

Gonzalo Pereira, IFOP's Executive Director, referred to new headquarters facilities, "we are very happy to have this new house that allows us to be more comfortable, since we are in the center of this beautiful city, which facilitates accessibility, Spaces in this headquarters are more modern, and allow workers to have everything they need, both for their work and for their daily lives. We have commercial premises, banks, schools nearby, in the other headquarters we were very far from everything. The laboratories and meeting rooms, like the workers' offices, are very modern, illuminated and with pleasant spaces for everyone"

### Main areas

The new facilities aim to contribute to infrastructure's improvement which is directly related to research activities, through fitting out physical spaces and laboratories conditioning for 26 workers.

It will have laboratories for:

- Histology Laboratory
- Preshipment Laboratory – Flour Analysis
- Wet Laboratory



## IFOP participated in 2nd Viña del Mar Cultural and Citizen Book Fair

On December 13th and 14th, 2nd Cultural and Citizen Book Fair took place at Quinta Vergara in Viña del Mar. IFOP participated with a stand, in which it showed the institution's work. The activity was attended by Viña del Mar's Mayor Macarena Ripamonti, IFOP's Director, Gonzalo Pereira, Carlos Kirkwood in charge of Marine Protected Areas of the National Fisheries and Aquaculture Service (Sernapesca) and various local and municipal authorities. The world leader in innovation, Barbarita Lara, from Viña del Mar, also attended.

Children's literature valuable texts for Viña del Mar's first basic cycle municipal schools dependent on Municipal Corporation (CMVM), were donated by





Barbarita Lara prominent researcher and social coder, with Penguin Random House Group Publishing House sponsorship, which were delivered to Mayor Macarena Ripamonti, within 2nd Cultural and Citizen Book Fair 2023 framework that took place at Quinta Vergara.

“This is the Cultural Book Fair second version that emerges to give different publishers, authors, local artisans, from the region and who also deserve the possibility a solemn space for those who do dedicated work, to deliver knowledge, to promote critical relationship through books,” highlighted the community leader.

He added that “we have received publishers donations and also from Barbarita Lara’s, who is a source of pride, a Chilean and Viñamarina woman, who has put women’s name in the name of generating innovation for public service. “An honor and a pleasure, we hope that this is the second version of many more book fair.s”

Meanwhile, the most influential researcher in the world, under 35 years old, said she was “very happy to be able to bring books to Municipal Corporation of Viña del Mar schools, because they are treasures that open our minds, that connect us with the world, with what other scientists are doing, tell them our story that there is local talent, the work that IFOP does, how important data is, of managing it and acquiring power from it.”

In this second version, Fisheries Development Institute (IFOP) joined with socio-educational workshops around environmental care and awareness. Those attending the fair were able to learn about the ocean, its care, sea turtles, their habitat, threats they face, what they feed on. They were able to observe otoliths, which are calcareous structures found in the skull of fish (middle ear) and whose function is balance; however, when they grow in proportion to fish, they leave marks (concentric rings) that allow them to determinate their age. People were also able to enter the Humboldt Current Alert, Prediction and Observation (SAPO) system, where they could observe positive establishment of El Niño anomaly off Peru and



Chile, discuss climatic change, and understand to maintain oceanographic information networks importance in real time.

Gonzalo Pereira, its Director, highlighted that “reading is a training basis from children, young people, to being a professional with different academic levels. Participating in this fair is very important for Fisheries Development Institute, since it allows us to do scientific dissemination to the community, our professionals in an entertaining and educational way deliver their knowledge to fair’s all visitors”

## Cultural Fair

In its second version, the fair organized by CMVM had 34 stands from publishers, bookstores and universities, and was held free of charge on Wednesday 13th and Thursday 14th at Quinta Vergara’s main entrance, offering a literary promotion space for Viña del Mar families and surrounding communities.



RETURN



## Ocean surface carbon data and synthesis observations workshops, held in Flanders, Belgium

Between November 6th and 9th, at Flanders Marine Institute, Belgium, Synthesis observation and PCO<sub>2</sub> data at ocean's surface workshop was held.

This event brought together more than 100 ocean experts, in ocean surface carbon measurements and quantification of carbon uptake in the ocean, with representatives from Europe, Australia, Asia, North America, South America and Africa, to assess multi-component community effort status capable of measuring, storing, synthesizing and mapping surface ocean carbon information.

At this event, topics such as: Uncertainty in data-driven air-sea CO<sub>2</sub> fluxes were addressed and discussed; Progress in SOCONET's development (Surface Ocean CO<sub>2</sub> Observing Network) CO<sub>2</sub> network and pCO<sub>2</sub> products to inform: The value (in quantitative terms of pCO<sub>2</sub> mapping uncertainty) of existing measurement infrastructure, impact of a decrease in global sea surface pCO<sub>2</sub> measurements since 2018, measurement quality impact focusing on local and global scale uncertainties and biases in air-sea CO<sub>2</sub> flux reconstruction. SOCAT (Surface Ocean CO<sub>2</sub> Atlas) future direction was also brought to the table and current data submission and quality control practices, including uncertainties quantification, were reviewed.

Finally, agreements were reached to continue working and collaborating to create a robust, resilient and sustainable ocean surface carbon observing system, helping countries better understand and manage climatic change causes in a timely and efficient.sustainable manner.



## In Japan, Fisheries Development Institute's Researchers participated in (ICHA 2023) harmful algal blooms main world conference

Between November 5th and 10th, in the city of Hiroshima Japan, (ICHA 2023) Harmful Algae International Conference twentieth version was held, an event attended by 550 scientists from 70 countries. Fisheries Development Institute, through the Harmful Algae Research Center (CREAN IFOP) was present with 3 researchers, Dr. Gonzalo Fuenzalida, Dr. Oscar Espinoza and Dr. Leonardo Guzmán. Chile on this occasion was only represented by 7 researchers linked to these events, belonging to Universidad de Concepción, Universidad de Magallanes and Fisheries Development Institute.

Dr. Fuenzalida presented a contribution developed by five co-authors, "Exploring omics technologies for effective HABs monitoring in Southern Chile", which showed the application of metabarcoding ("metabarcoding") and metagenomics, as tools to improve monitoring. of harmful algae in Chile. To do this, he sequenced the 18S ribosomal gene from samples collected at 34 sites distributed between 36° and 55°, from the Biobío region to the Beagle Channel in the Magallanes region and Chilean Antarctica, which made it possible to evaluate the composition and diversity of phytoplankton assemblages, with variations in richness and dominance observed between studied areas, Pacific Ocean and fjords/channels in the south of the country; The observed variability probably originates from differences between both sectors in temperature, salinity and nutrient levels. Regarding metagenomic analysis, 4,670 genes associated with responses to temperature, light intensity, nutrient assimilation, and toxin production were identified, providing background information on the key metabolic pathways that underlie the physiological and metabolic changes of the assemblages of phytoplankton. The results of this research provide very valuable information for strategies aimed at predicting and mitigating harmful algal bloom events in Chile.

For his part, Dr. Espinoza presented "Harmful algal blooms dy-





namics and toxic outbreaks in coastal waters of Central-Southern Pacific Ocean Chile (36°-44°S)” research, whose co-authors were 10 researchers, providing valuable information to support monitoring and future actions, particularly in a climatic change scenario. The study evaluated phytoplankton assemblages and harmful species occurrence in the Pacific Ocean of central southern Chile between 2016 and 2023, showing from a hydrographic point of view 3 latitudinal transition areas, Biobío (BB), La Araucanía-Los Ríos (AR) and south of the Chacao channel (LL). Various harmful blooms, different microalgae and different toxins are shown.

During the period studied, blooms occurred with a high abundance of dinoflagellates during the fall of 2016 and the summer of 2018 with atmospheric-oceanographic conditions that favored *Alexandrium catenella*'s proliferation (5,000 and 375 cells mL<sup>-1</sup>, respectively) with a high concentration of paralyzing toxin in shellfish (6.6 x 10<sup>3</sup> and 1.5 x 10<sup>3</sup> µg STX eq 100g<sup>-1</sup>, respectively) in LL. Furthermore, during the summer of 2018, a Kareniaceae flowering occurred (390 cells mL<sup>-1</sup>), causing mass death of pelagic and benthic marine organisms in the sector between LL and AR. During the summer of 2019, a flowering of *Dinophysis acuminata* (317 cells mL<sup>-1</sup>) with production of pectenotoxins (PTX-2) (54 µg kg<sup>-1</sup>) was recorded in the BB sector. The diatom *Pseudo-nitzschia cf. australis* was recorded during the summer and autumn of 2022 (2,000 and 200 cells mL<sup>-1</sup> in the LL and BB sectors, respectively), associated with the accumulation of domoic acid (DA) in shellfish (140 and 23.3 µg DA kg<sup>-1</sup>, respectively), with extractive bans in both areas. DA is also known as shellfish amnesia toxin.

Finally, Dr. Guzmán presented “Distribution and abundance of *Alexandrium catenella* in Chilean fjords”, a contribution developed by 8 co-authors. This microalgae in Chile is distributed between Coliumo (36°S) in the Biobío region and Mariotti islets (55°S) in Magallanes and



Chilean Antarctica region, being more frequent and abundant in fjords and channels. The study shows that in the last 15 years, in addition to the development of permanent monitoring to detect harmful microalgae and marine toxins, research actions have been carried out that have made it possible to have a hydrodynamic model that allows us to appreciate the processes that characterize the fjord system, and that it has been possible to incorporate particle dispersion models, which are applicable to harmful algal blooms. In this context, the effort to combine field work, laboratory experimentation and particle dispersion models to achieve a better understanding of *A. catenella* blooms was presented. The blooms of this microalgae that occurred in the central and northern sector of the fjords in the years 2018 and 2021 are contrasted, given that they showed different geographical coverage, but as a common feature the fact that both originated in the extreme south of the Aysén region, but the first was observed in the extreme south and southeast of Chiloé's large island. Hydrographic and meteorological conditions and distribution and abundance of *A. catenella* in both blooms are contrasted, concluding that for certain blooms, the direction and intensity of the winds and the behavior of surface currents are key to understanding the distribution and abundance of this dinoflagellate. and consequently the flowering may show a wide geographical coverage (blooming in 2018) or be limited to a more restricted sector of the fjords (blooming in 2021).



RETURN



## IFOP's scientific observer will collect information on cod in Antarctica

Chilean Fisheries Development Institute scientific observer, Gino Liche, embarked in Punta Arenas on Puerto Ballena factory ship, owned by Pesca Chile, which will carry out commercial cod fishing in Antarctica in Ross Sea, for approximately 90 days. This fishing campaign, which began on November 10th, considers biological collection fishing and ecosystemic data, and target resource and its accompanying fauna sampling, along with cod specimens measurement, marking and release activities in Antarctic waters, according to demanding protocols established by Conservation of Antarctic Marine Living Resources (CCAMLR) Commission. The process of recapturing already measured cod specimens allows estimating resource's growth rates and migratory routes or patterns in the area.

Considering the importance of carrying out joint activities for the country's benefit, IFOP together with Pesca Chile, which is a fishing company dedicated high-level Chilean fishing products capture, exploitation, development and marketing to the rest of the world, signed in October 2023 a collaboration agreement to carry out strategic research on the fishing resources captured in Antarctica.

The Antarctic Marine Living Resources Conservation Commission (CCAMLR) was established by an international convention in 1982 with the aim of conserving Antarctic marine fauna and flora.

Currently, fisheries targeting Antarctic cod (*Dissostichus mawsoni*) and secondarily targeting toothfish (*Dissostichus eleginoides*) are carried out in the Convention Area. These fisheries management is carried out by adopting a precautionary approach and management objectives seek to find a balance between "conservation" and "rational utilization" of living resources, in addition to preserving pre-existing ecological relationships. Catch limits for each fishery are determined by decision criteria that ensure fishery long-term sustainability.

Currently, a total of 26 European Union States are Members of the Commission. The list of Parties to the Convention is maintained by Australia, as Convention's Depositary.

Fisheries status and management are annually reviewed by Scientific Committee and its specialized working groups, using the best scientific knowledge and data available, including detailed data obtained from fisheries and fisheries surveys, as well as from "CCAMLR System of International Scientific Observation (SOCI)".



The SOCI is one of the main sources of essential scientific information to be able to evaluate fishing impact on the ecosystem and the state of both the populations of target species and populations of dependent and related species. All vessels operating in CCAMLR fisheries must carry a scientific observer on board throughout their fishing activities. Observers record details of fishing gear configuration (this includes measures taken to reduce incidental mortality of marine birds and mammals), fishing operations, biological measurements of target species and by-catch, fish tagging programs, boat sighting data and data on indicator species of the presence of vulnerable marine ecosystems.

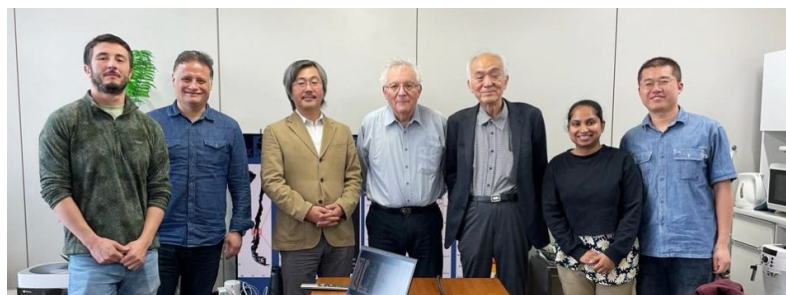


## Working meetings between academics from Hiroshima University and Chilean Fisheries Development Institute researchers

Between November 10th and 12th, after Harmful Algae International Conference (ICHA 2023) twentieth version held in Hiroshima Japan, thanks to a kind invitation from Prof. Dr. Fumito Maruyama from that University, work meetings linked to recently completed MACH IN CHILE (Algae Monitoring in Chile) study developed between April 2018 and March 2023 post-project actions were held; which was aimed at incorporating molecular techniques use (metabarcoding: metabarcoding) in microalgae assemblages and associated bacteria to achieve a better understanding of these microorganisms dynamics, in addition to developing certain harmful blooms prognostic skills.

This research was supported by Japan's Cooperation Agency (JICA) and JST (Japan Science and Technology Agency), an equivalent to Chilean National Research and Development Agency (ANID). The University of Hiroshima, the University of Kyoto, the University of Okayama and Fisheries Research and Education Agency participated on behalf of Japan, while Chile was represented by Universidad de Antofagasta, Universidad de la Frontera, Universidad de Los Lagos and Fisheries Development Institute. Researchers from this last institution are precisely Dr. Oscar Espinoza, Dr. Gonzalo Fuenzalida and Dr. Leonardo Guzmán, who participated in working meetings with Prof. Dr. Ichiro Imai, Dr. Fumito Maruyama, Dr. Ishara Perera and Dra So Fujiyoshi.

The central theme was to address progress in research developed together using EDM approach (empirical dynamic modeling), using different databases, to obtain a microalgae assemblages better understanding associated with harmful algae and weigh this tool potential for certain blooms predictive purposes. On the other hand, a working meeting was also held with Dr. Ryuichi Hirota from the same university, who will travel to Chile in May 2024, who works on phosphorus



metabolism in bacterial populations of marine sediments.

The occasion was conducive to evaluate post-project progress achieved during 2023 and schedule work for the fall of 2024, an opportunity in which Dr. Maruyama and Dr. Fujiyoshi will travel to Chile.

Financial support for Chilean researchers, both to attend ICHA 2023 and Hiroshima University, was covered by resources provided by CORFO, IFOP and FONDEF.

## Important harmful blooms and marine toxins international scientific conference will be held during October 2025, in Punta Arenas's city

IT WILL BE ORGANIZED BY FISHERIES DEVELOPMENT INSTITUTE

Between November 5th and 10th, at Gran Prince Hotel in Hiroshima Japan, the Harmful Algae International twentieth version conference, known by its acronym ICHA in English (International Conference on Harmful Algae), was held. carried out every two years.

Harmful algal blooms are natural events caused by different microalgae, some of which produce toxins or other compounds that contaminate seafood, affect public health and cause mortality in aquatic ecosystems's organisms







and also in aquaculture systems farming. Its effects can be of great intensity for affected communities social and economic sectors. Currently, these blooms and toxic outbreaks have become more frequent and cover new geographical sectors, and the effect of extreme oceanographic climatic situations (such as El Niño and La Niña; Antarctic Oscillation or Southern Annular Mode) and climatic change cannot be ruled out, at a global level, in this type of events occurrence. Harmful algal blooms affect various countries, not only in marine ecosystem, but also in lakes and rivers ecosystems. Consequently, there are various scientists groups, distributed throughout the planet, aimed at achieving a better understanding of these blooms and their effects, and in turn, each country or region has developed capabilities and has means that allow them to monitor and manage these blooms occurrence effects.

Next ICHA's version will be held in Chile, in Punta Arenas city, between October 19th and 24th, 2025. Our country selection was a consequence of an application made in 2021 during ICHA's nineteenth version development, which was held in La Paz, Mexico. This application was made to Harmful Algae International Scientific Society assembly (ISSHA), at that time chaired by Dr. Vera Trainer from USA and which, in the next two years, will fall to Dr. Dedmer van de Waal from the Netherlands, who receives management chaired by Dr. Wayne Litaker from USA.

For this reason, last November 10th, during ICHA20's special session meeting, organized by ISSHA assembly. Dr. Leonardo Guzmán from Fisheries Development Institute had the opportunity to remember and motivate attendance at the meeting to be held in Chile, an occa-

sion that was propitious to highlight this type of event's importance and responsibility that its organization represents for Chile, in addition to stimulating attendance at this meeting, highlighting the importance that it takes place in the Southern Hemisphere, particularly in the southern tip of America, in Chile, and in Punta Arenas's city. On the occasion, a video related to ICHA 21, Magallanes and Chilean Antarctic region and the place where this meeting will be held was presented, highlighting its historical particularities, geographical and diverse natural attractions that the southernmost region of the country exhibits.



These conferences usually bring together between 400 and 600 people, from at least 50 countries, which represents a great challenge not only for the country, but also for IFOP, which will have the greatest responsibility in organizing this scientific meeting. In the coming days, the first meeting will be held aimed at taking the first steps towards planning and fully assuming commitments linked to this scientific event, an instance in which a high proportion of national scientific community, oriented to harmful algal blooms and marine toxins topic is expected to participate. Without prejudice to this, all institutions and people linked to FAN are invited to support and participate in this important scientific event. planning and implementation.

The twenty-first ICHA's version that will be held in our country constitutes the third opportunity to be held in a Latin American country, since it had previously been held in Brazil 2016 and Mexico 2021, and three quarters of these meetings have been held in Northern Hemisphere countries.

RETURN



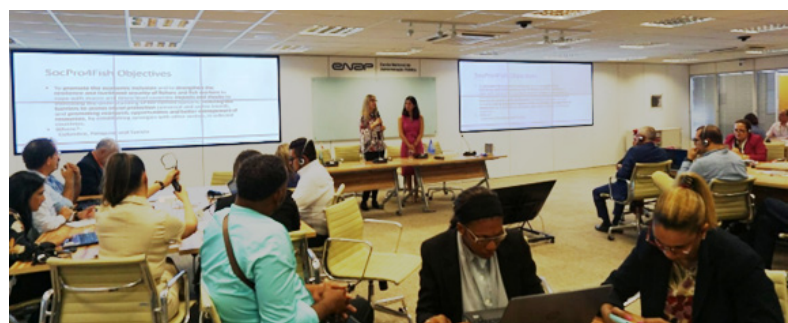
## IFOP researchers Nancy Barahona and Andrea Araya participate in a social protection for fishing and aquaculture sector workshop in Brazil

Between November 29th and December 1st, United Nations (FAO) Food and Agriculture Organization held a “Social protection for fishing and aquaculture sector” Workshop in Brasilia, Brazil. This activity was attended on behalf of Chile by Nancy Barahona Toledo IFOP Fisheries Evaluation Department’s Head, along with Andrea Araya Arriagada researcher from Economics Section. While, as a State’s institutions representative, Ivonne Montenegro Urbina, Fisheries and Aquaculture Undersecretariat Sectoral Analysis Department professionals also participated.

The workshop included an experiences exchange between various countries that expressed their interest to FAO in learning about suitable fishing sector social protection measures expansion. Among participants were Tunisia, Cape Verde, Colombia, Ecuador, Peru, Brazil, Paraguay and Chile, as well as International Labor Organization, among other institutions. In this space, each country presentations were highlighted, generating significant discussions about their respective social protection programs aimed at fishing and aquaculture sector; which addressed different aspects related to social protection programs implementation cycle, fisheries and social registries, revolving funds, community social protection programs and alternative livelihood programs and fishermen productive inclusion during closed seasons. In addition, a panel was held where the fishermen themselves shared their challenges, vulnerabilities and social protection needs. In this workshop, Chile presented a work titled: Social protection programs accessible to fishermen, including strengths and challenges.

FAO is working to increase social protection coverage for fisheries and aquaculture sector, with the fundamental purpose of improving fishery

resources management, rehabilitating communities that depend on fishing and aquaculture livelihoods, and increasing their capacity. resilience to social and governmental changes, resources availability, environmental changes, among others. To achieve this goal, FAO is strengthening coordination and dialogue with relevant entities to expand social protection scope in fisheries and aquaculture sector. This approach, in turn, provides support to member countries to achieve Sustainable Development Goals (SDGs) (especially SDGs 1.3 and 1.5) and implement Voluntary Guidelines for Achieving Sustainability of Small-Scale Fisheries in the Context of food security and poverty eradication (SPP Guidelines). Both instruments highlight the importance of the sector socioeconomic development .



Within this work, priority area framework and with Norwegian Agency for Development Cooperation (Norad) support, through the social protection component for fisheries and aquaculture (SocPro4Fish) of “Responsible use of fisheries and aquaculture resources for sustainable development” (GCP/GLO/352/NOR) project, FAO is carrying out various initiatives to expand its sector social protection coverage, access and adequacy. Such activities include building capacity to effectively implement and expand social protection in the sector, conducting impact assessments of social protection programs such as unemployment insurance during Brazil’s closed seasons, and developing a global database of the sector’s social protection programs, which serve to carry out a trends detailed analysis, deficiencies, barriers and opportunities for social protection programs implementation as well as to promote better coherence between social protection, fisheries management and conservation. In addition to implementing activities in Colombia, Tunisia and Paraguay, FAO is also implementing actions in colla-



RETURN



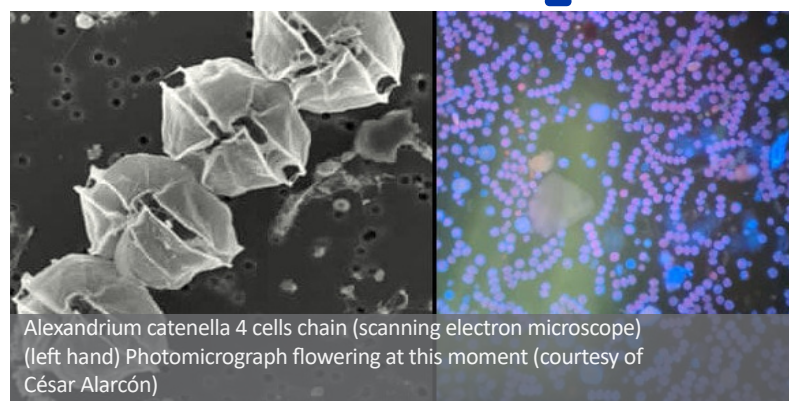


boration with other countries, and through this workshop, it promoted an exchange of South-South cooperation, aimed mainly at sharing lessons learned and effective strategies to expand successful interventions.

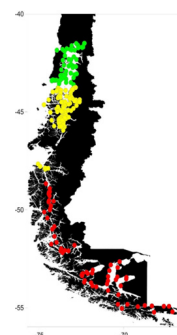
## Intense flowering of *Alexandrium catenella* in Última Esperanza extreme north of Magallanes and Chilean Antarctica region province

Dr. Leonardo Guzmán Méndez, red tide monitoring program head in national fjords (between Reloncaví estuary in Los Lagos region to Mariottti islets, in Magallanes region and Chilean Antarctica extreme south), has reported that in Última Esperanza province, particularly between Adalberto Channel and Topar Island, an intense flowering of *Alexandrium catenella* is occurring, a microalgae that is linked to the paralyzing toxin in shellfish. The last sampling carried out between November 16th and 22nd shows a wide geographical coverage with very high levels of this microalgae, which gradually began to manifest from September and it is expected that this condition could last until January or February 2024. The presence of toxic shellfish, given that the dynamics of elimination of the paralyzing toxin from the shellfish tissues is slow, they could present paralyzing toxin, if these conditions continue, at least until the fall of 2024.

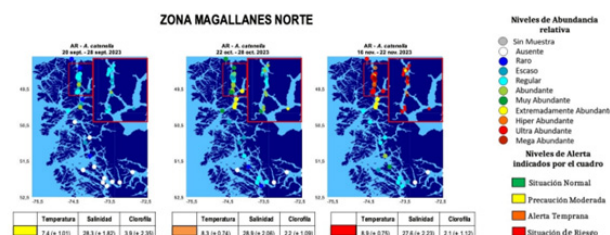
If the 39 sampling sites established in Última Esperanza are considered, average values of relative abundance ( $\pm$  standard error) were 1.8 ( $\pm 0.21$ ); 3.3 ( $\pm 0.26$ ) and 6.0 ( $\pm 0.42$ ) for the months of September, October and November, respectively, while if only the sites where flower-



*Alexandrium catenella* 4 cells chain (scanning electron microscope) (left hand) Photomicrograph flowering at this moment (courtesy of César Alarcón)



The colored dots show sampling sites location, green in Los Lagos, yellow in Aysén and red in Magallanes. The sector that is currently being affected by *Alexandrium catenella* flowering is highlighted with an oval with white outlines



Maps showing, following a color palette, the values of the relative abundance estimators of *Alexandrium catenella* in Última Esperanza province in Magallanes and Chilean Antarctica region extreme north. Color palette of alert levels is included

ring is occurring (30 sites) are considered, these They present values of 2.5 ( $\pm 0.15$ ); 4.0 ( $\pm 0.23$ ) and 7.5 ( $\pm 0.24$ ) for the same months. It is considered that during December the estimates of relative abundance should be maintained or slightly declined, and a field campaign is planned for the next few days to follow the evolution of flowering (see photograph).

From the environmental point of view, water temperature ( $^{\circ}\text{C}$ ), salinity (psu) and chlorophyll-a ( $\text{mg m}^{-3}$ ) average values ( $\pm$  standard error), are normal for this period of the year, with temperatures averages of 8.9 ( $\pm 0.75$ )  $^{\circ}\text{C}$ , similar to the values recorded in same period of previous year (8.5)  $^{\circ}\text{C}$ , normal salinity (27.6 psu), and low values of chlorophyll-a of 2.1  $\text{mg m}^{-3}$ .



RETURN

## IFOP organized carnival for sea turtles conservation in Arica

The Biodiversity Group of IFOP's Oceanography and Environment Department, on November 18th and 19th in Arica city, held "Sea turtles conservation Carnival, Arica 2023" under the framework of "Improving the conservation of sea turtles through education and outreach to local communities in northern Chile" project with financing from the organizations SWOT (The State of the World's Sea Turtles), Oceanic Society and the LaudOPO Network.

The carnival was focused on fishermen and their children and took place in the mornings at the Independent Workers Union of Artisanal Fishermen of Arica headquarters, located in city's fishing terminal. Dr. Zárate commented on the activity "during the day children learned about biology and ecology sea turtles aspects, the species present in Chile and their threats, which was accompanied by videos and stories that served as motivation for them. The children will draw pictures and ask questions.

Dr. Zárate added "we focus on transmitting information to children about the importance of turtles and the environment in which they live, both their nesting beaches and the sea, and thus foster interest in the care of animals and nature. This activity brought them closer to sea turtles, animals that, despite not being observed so frequently, are a fundamental part of the marine ecosystem of our country."

Between the two days of the Carnival, there was the participation of 42 children between 2 and 14 years of age, most of them fishermen's relatives, but there were also some who visited La Caleta that day with their parents and who were motivated to be part of this activity.

We had the presence of "Laudita", a leatherback turtle who told stories to the children and inspired them with her life story and adventures.

Msc Ilia Cari added "The link between science and citizenship is relevant for conservation, which is why these types of instances, aimed es-



friendly baby soccer match between fishermen and IFOP officials, an awards ceremony and a ceremony between teams.

The activity was led by Dr. Patricia Zarate, and researchers Ilia Cari and Ljubitzta Clavijo from IFOP Valparaíso. Staff from the IFOP headquarters in Arica and Iquique and members of the local NGO Tortu Arica participated in the coordination and execution of the event.

## El Niño and Climatic Change Workshop Tarapacá Region's Risk Management and Mitigation of its Effects

On Monday, December 4th, in Iquique city, the national seminar "El Niño and Climatic Change, Risk Management and Mitigation of its Effects for Tarapacá Region" was held, organized by Universidad Arturo Prat; Fisheries and Aquaculture Undersecretariat, Environment Seremi and Maritime Governance, plus Fisheries Development Institute sponsorship, Alert, Prediction and Observation System (S.A.P.O.), Sea Applied Research, Norte Grande Corporation, Federation of Artisanal Fishermen and Shellfish Divers, Promar Center Pacífico, Economics Seremi, Health Seremi, National Fisheries and Aquaculture Service. This seminar featured the participation of national researchers such as Dr. René Garreaud (Universidad de Chile) and Dr. Raúl Cordero (Universidad de Santiago de Chile), as well as regional experts, who analyzed various perspectives of El Niño and Climatic Change.



RETURN





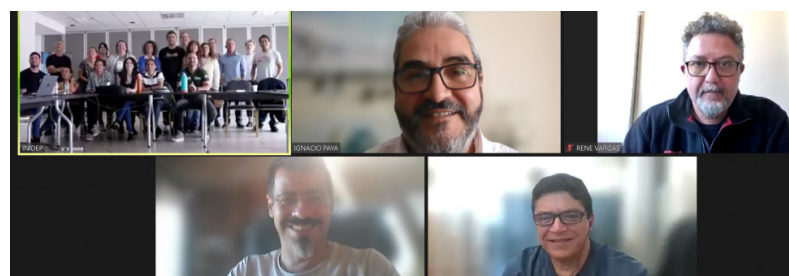
Graciela Pérez Mora, IFOP researcher explained “Scientific observers of IFOP’s northern zone together with S.A.P.O project, since March 2023, have been recording and photographing the presence of species that have been entering northern coasts due to EL NIÑO effect. A background with which a banner was made, which was presented at this seminar. Among the background presented information, the record of specimens that had already been observed in past NIÑOS events stood out, such as the species *Selene brevoortii* and *Scomberomorus sierra*, as well as species not previously documented such as *Zu cristatus*, *Sphyrna flavicauda y ensis*, *Polidactylus approximans*, Fregata Oceanic Society y la LaudOPO network, among others.”

## IFOP of Chile and INIDEP from Argentina held a workshop on hoki within the framework of both institutions’ existing cooperation agreement

On December 6th, “Interdisciplinary workshop to discuss biological-fishery aspects of hoki (*Macrurus magellanicus*) and the environment in which it lives” was held throughout the day within the framework of IFOP-INIDEP cooperation agreement.

The objective was “to carry out a comprehensive and interdisciplinary analysis of hoki’s (*Macrurus magellanicus*) biological, oceanographic and fishing aspects. This workshop aims to be the beginning of others that will allow us to approach, with more comprehensive knowledge, future research cruises and obtain a campaign design that adapts, if necessary, to changes that our fishing resources manifest today.”

It was organized by Anabela Zavatteri presentially at INIDEP, and by Ignacio Payá remotely at IFOP. Researchers from Fisheries Development Institute (IFOP) made four presentations electronically: Conceptual model of the stock in Chile and Southern Cone of America (Ignacio Payá); Biological-Fisheries indicators of hoki in Chile (Renato Céspedes), Hoki spawning stock evaluation, in external waters between Aysén regions lakes, 2022 (Rene Vargas), Stock and status evaluation of stock in Chile (Ignacio Payá).



### A multidisciplinary group of INIDEP’s researchers presented:

Hoki general biological-fishery aspects; Summer evaluation campaign of southern demersal resources; Hydroacoustics; physical oceanography; Zooplankton; Nutrients; Bio-optics and phytoplankton; Benthos; Presence of hoki in other research campaigns and in the tangon fleet; and Hoki in Falkland Islands.

In both oceans: biological-fishery indicators, abundance estimates from campaigns (research cruises) and stock assessments have decreasing trends, hoki biomass is below Maximum Sustained Yield (MSY) biomass. and fishing fleets have been reduced, reducing fishing mortality below the MSY fishing mortality, catch quotas have been adjusted downwards in recent years.

Various ideas for multidisciplinary studies were identified, and the need to continue with comparative and cooperative analyzes between INIDEP and IFOP.



## Workshop to raise perceptions on Ecosystemic Approach implementation's associated gaps for Benthic Resources Management and Exploitation Areas regime decision making

The workshop holding was framed in a technical advisory service from IFOP to “Strengthening management and governance for the conservation and sustainable use of biodiversity of global importance in coastal marine ecosystems in Chile” GCP/CHI/043/GFF project, which consists of Ecosystemic Approach piloting in two management areas (as studies case). Although General Fisheries and Aquaculture Law defines ecosystemic approach, this workshop focused on its international definition, considering FAO’s recommendations made in 2016 to the law. In this context, ecosystemic approach, applied to marine-coastal environment, is a strategy that promotes integrated management of all existing resources in this environment, seeking their sustainable use, in a fair and equitable manner. It is a management approach that integrates ecological, economic, sociocultural and institutional components. Being thus considered as a management instrument under a holistic approach, focused on decision-making processes that balance ecological well-being with human and social well-being, within improved governance frameworks. That is, it is a practical way to achieve sustainable development.

This workshop was aimed mainly at public institution actors who in one way or another are related to management areas management. In this workshop, progress was made in identifying gaps for ecosystemic approach implementation, as well as possible actions to take to overcome these gaps and get closer to this approach’s implementation in Chile’s coastal ecosystemic governance.

As part of this workshop results, gaps were identified at two levels for ecosystemic approach implementation: first at national and institutio-

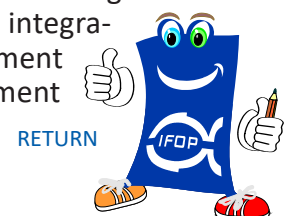
nal level and then particularly at management areas level. In general, progress is recognized regarding ecosystemic approach principles incorporation, but it has been mainly led by personal actions or groups of people.



The researcher Pedro Romero highlights that the conversation held in the workshop allows us to observe a series of difficulties in concepts internalization such as socio-ecological paradigm and management model based on an ecosystemic approach, considering that any advance in terms of data collection information comprehensively meets focus, which is far from reality. Much of the dysfunction originates because there is no program or public policy that allows efforts of different public agents to be aligned towards a common objective, which causes each institution and department to look after its own interests, making actions aimed at integration of visions are associated with individual efforts of the professionals on duty.

IFOP fisheries division head, Dr. Carlos Montenegro, highlighted this type of projects’s importance, which allow bridging gaps, not only in understanding of all actors regarding ecosystemic approach in fisheries, but also allow share visions regarding concrete actions that can be implemented to realize a desire shared by all sectors, which is sustainable development and its all associated socio-ecological systems components sustainability with hydrobiological resources extraction activities in our coasts.

By her side, Manuela Erazo, FAO’s implemented Coastal Marine Governance project’s national coordinator, added that “these meetings are essential not only to identify integrated and sustainable management in Benthic Resource Management





Areas opportunities, but also to develop and “strengthen, among relevant actors, a vision of this sector’s long-term development, in which prevails a marine resources protection seal, as well as its inhabitants productive activities.”

Likewise, Erazo added, “this exercise is another example that different local actors participation strengthens instances that promote good governance, our project’s general objective,” he concluded.

Finally, researcher Dr. Bryan Bularz highlighted as a workshop general conclusion, the importance of understanding that change towards ecosystemic approach is a process, where each advance, no matter how small, is a step closer to achieving the goal. However, it is necessary to have a program that defines clear objectives to advance at the institutional level (within and between institutions), and at the country level towards management with an ecosystemic approach to fishing.



RETURN