



# Monitoring Network Protects International Aquaculture Investment Zones

Worldwide, the driving force in the aquaculture industry is the growing demand for healthy food sources for humans. Aquaculture is the cultivation or “farming” of aquatic species.

Located in southwestern South America, Chile is the world’s second largest salmon and trout producer, due in large part to the high quality of its Antarctic-fed Pacific Ocean waters. It exports over \$1 billion in farm-raised salmon and trout per year. (There is no native salmon in southern hemisphere.) Managing the effects of large-scale farming practices on the water resources is a long-term challenge for not only the country but also the commercial companies working here.

In order to protect this economic venture, Chile’s government awarded a grant to INTESAL (Technological Institute of Salmon), a nonprofit group, to support sustainable use of the country’s fishing resources. Research from INTESAL is used by participating commercial companies -- such as Fjord Seafood of Norway, Salmones Multiexport, AquaChile, Salmon Chile, and Marine Harvest -- to improve farming practices and monitor environmental impacts.

YSI environmental instruments and systems are part of INTESAL’s extensive water monitoring and data collection network.

## Project Allows Salmon Industry to Respond to Environmental Phenomenon

“[This] project has enormous value for the region,” stated Adolfo Alvial, manager of INTESAL, to Simtech Ltda, YSI’s Chilean selling partner.

The region referred to is around the city of Puerto Montt, capital of Chile’s X Region (Los Lagos), and Chiloé Island. Here, INTESAL has five monitoring stations plus one in Duncan Port (in the southern XI Region). The stations continuously monitor various water and weather conditions. This data, and satellite imagery from NOAA, Envisat, and SeaStar, are combined into

a comprehensive SEI (System of Environmental Information), which informs predictive models for climatic changes in surf, tides, and plankton proliferations as well as possible diseases in salmon.



*A monitoring station near sea cages in Chile.*

All of the environmental data is crucial to protecting the aquaculture investment. Remote monitoring of water quality and velocity at fresh water fisheries, lake sites, and marine centers allows INTESAL to create and control the best conditions for fish. It also provides early warning for potential threats – such as noxious algal blooms, low dissolved oxygen events (which cause stress in the fish), weather phenomenon such as high winds and large tidal fluctuations (which might destroy equipment and structures), and aggregations of jellyfish and sea lions (which may harm the fish cages).

“For cultivation centers to have this information is key and the information coming from this predictive model will be decisive,” expressed Alvial.<sup>1</sup>

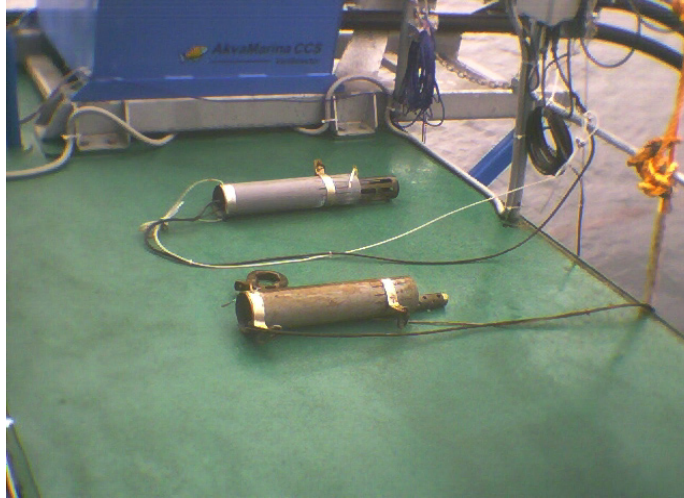
The SEI is important not only for commercial interest but also for environmental ones. Opponents of large-scale fish farming operations claim that nitrogen from fish waste is a contributing factor to harmful “red tides.” High levels of nitrogen aid the growth of algae, both toxic and nontoxic, and the proliferations of toxic algae create anoxic “dead zones” in the water – oxygenless areas where marine life cannot live.

The cultivation centers study data about water temperature and levels of dissolved oxygen, chlorophyll, and salinity (conductivity). Near real-time transmission of data from the monitoring sites to a base station gives researchers the information right when they need it. This in turn allows them to track trends and act in situations where fish health or production is threatened or where farming practices threaten to affect the surrounding areas.

*(continued)*

One of the monitoring sites is in Pulelo, in the Chacao Channel between Puerto Montt and the Chiloé Island. Chacao is on the edge of a continental shelf and the swiftly moving Pacific drives strong currents into the channel along with stormy weather.

Salmon farming here requires rugged equipment. The site uses two YSI multiparameter 600XLM sondes with sensors for water temperature, dissolved oxygen, and conductivity, and a SonTek/YSI Argonaut-XR acoustic Doppler current meter. The system also includes an Endeco/YSI 6200 data acquisition system with meteorological station (measuring wind speed and velocity, solar radiation, rain gauge, barometric pressure, and air temperature). The equipment is mounted on a feed pontoon near sea cages; data is transmitted via radio frequency to a base station on land, which relays the information via Internet or cellular modem (GMS) directly to INTESAL facilities.



YSI water quality sondes on a feed pontoon in the Chacao Channel.

INTESAL's five other monitoring sites are similarly equipped.

### Project's Long-term Results Benefit Environment and Industry

The total cost of this large-scale initiative exceeds \$1 million; it is funded by INTESAL, its participating commercial companies, and the Fund for Development and Innovation (FDI) of Corfo.

José Miguel Troncoso, an INTESAL supervisor, summarizes the long-term goals<sup>2</sup> of the monitoring project as:

- quantify processes that define the ecosystem in which salmon are developed;
- integrate data (plankton, benthos, oceanography, meteorology) in a local-scale model; and
- extrapolate information, with support of satellite technology and water forecasting, to a meso (regional) scale.

Regional models and predictions for environmental changes are helping INTESAL's partner companies define new farming options – and transfer these practices to the industry. These practices are designed to protect fish health and increase production while at the same time responsibly using Chile's water resources.

*For more information about INTESAL, please visit [www.intesal.cl](http://www.intesal.cl).*

*For additional information about YSI water quality monitoring systems, please contact YSI:*

*Tel. +1 937 767 7241*

*US 800 897 4151*

*Fax +1 937 767 9353*

*Email. [aquaculture@ysi.com](mailto:aquaculture@ysi.com)*

*Web. [www.ysi.com](http://www.ysi.com)*

*Footnotes:*

<sup>1</sup> As quoted in *Salmonoticias*, Chilean salmon industry trade publication.

<sup>2</sup> As quoted in *Salmonoticias*, Chilean salmon industry trade publication.