AQUACULTURE ZONE DEVELOPMENT AND MANAGEMENT : CHILE CASE

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CONTENTS

1.- Background of Chilean Aquaculture

2.- Aquaculture zone management milestones

3.- Policy and technical approach for aquaculture zones

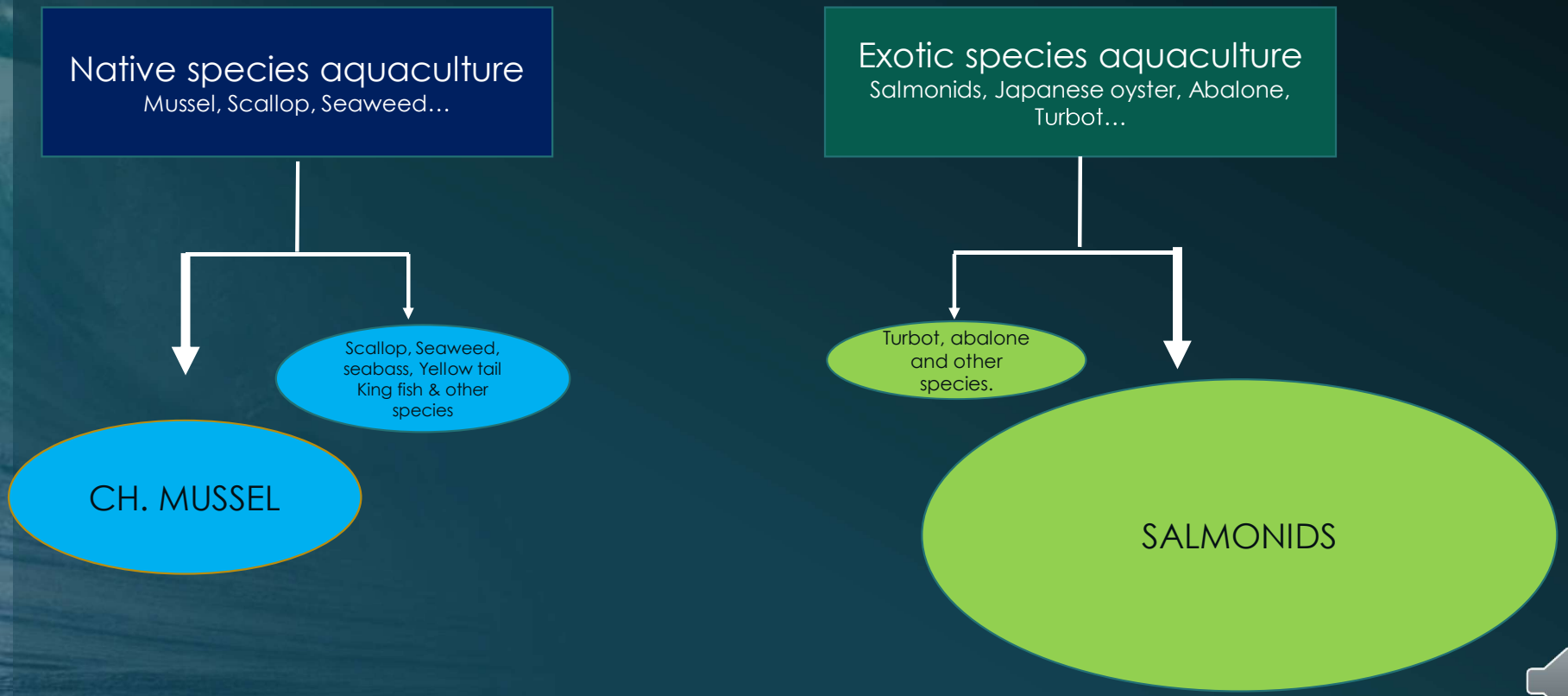
4.- Science needs and resources associated with aquaculture zones

5.- Lessons learned and future priorities

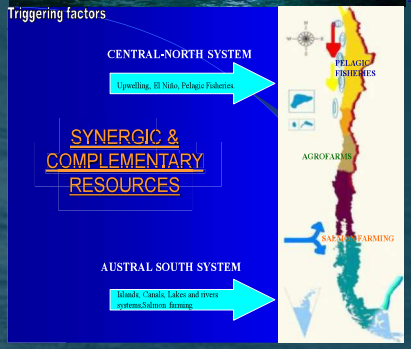
1.- Background of Chilean Aquaculture

The Salmon industry influence

TWO EVOLUTIONARY LINES IN CHILEAN AQUACULTURE



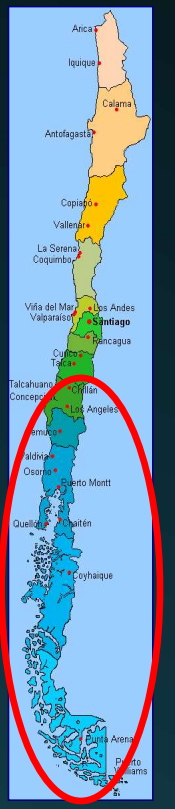
SALMONIDS DOMINATE THE INDUSTRY (SINCE MIDDLE 80'S)



A great product with a great market

Hugh space to farm salmon advantageously

Fundamental feed raw materials in the same country



1.900 km

MUSSEL IN FIGURES

2nd
World producer after China

60 Export markets

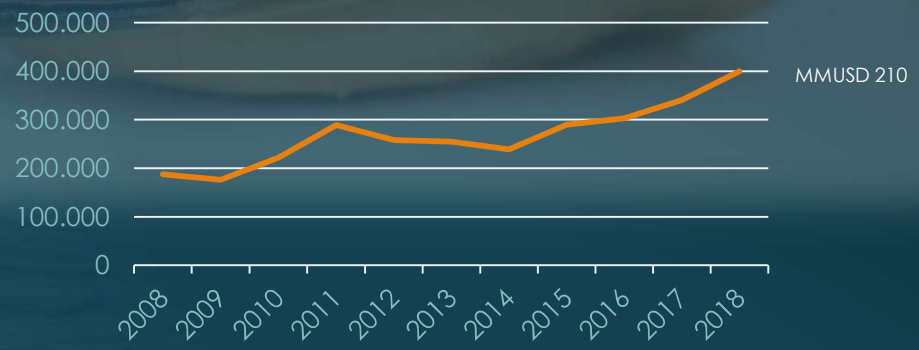
MMUSD210
export value
Harvest
400.00 ton 2018

91% of
markets for frozen products

1st
World export country

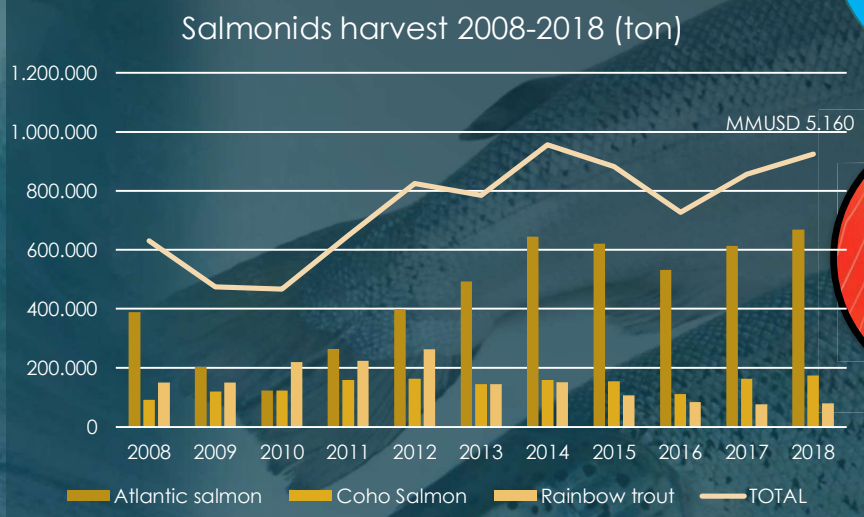
72% Exported to Europe

Chilean mussel harvest 2008-2018 (ton)



CORFO CHILE

SALMONIDS IN FIGURES



U$MM 5.160 Export and 924.000 ton. Harvest 2018

2nd export sector after cooper

90% Of Chilean aquaculture

74% of the total export value in fisheries + aquaculture

70.000 Direct and indirect jobs

110 foreign markets

1.200 supplier linked companies

2nd world producer of A. salmon and 1st in trout and coho salmon

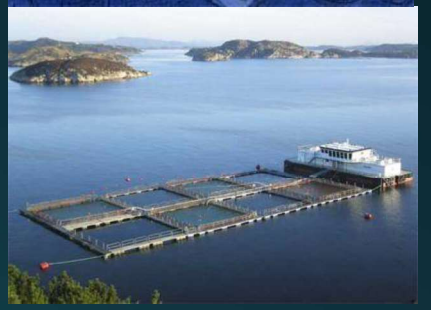
CORFO CHILE

2.- Aquaculture zone management milestones

Essentially driven by Salmon aquaculture

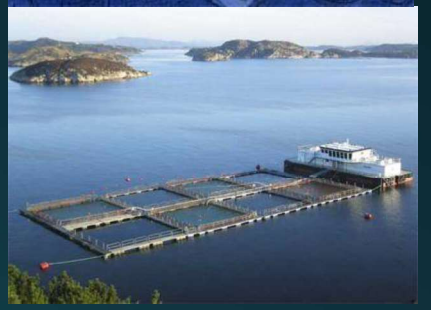
MILESTONES

- **Before the 70's**: Small scale & self – sustaining activity.
- **At the end of 70's & early 80´s**: Active R&D&I and technology transfer process. Development of salmon, mussel, scallop & seaweed farming.
- **Until 1988**: The fast salmon industry growth exceeded the capacity of the Government to establish adequate regulation.
- **1991:** The General Law of Fisheries and Aquaculture (GLFA) there were established comprehensive regulations for the sector, including **Licenses, AAA & fish health and environmental mgmt.**



MILESTONES

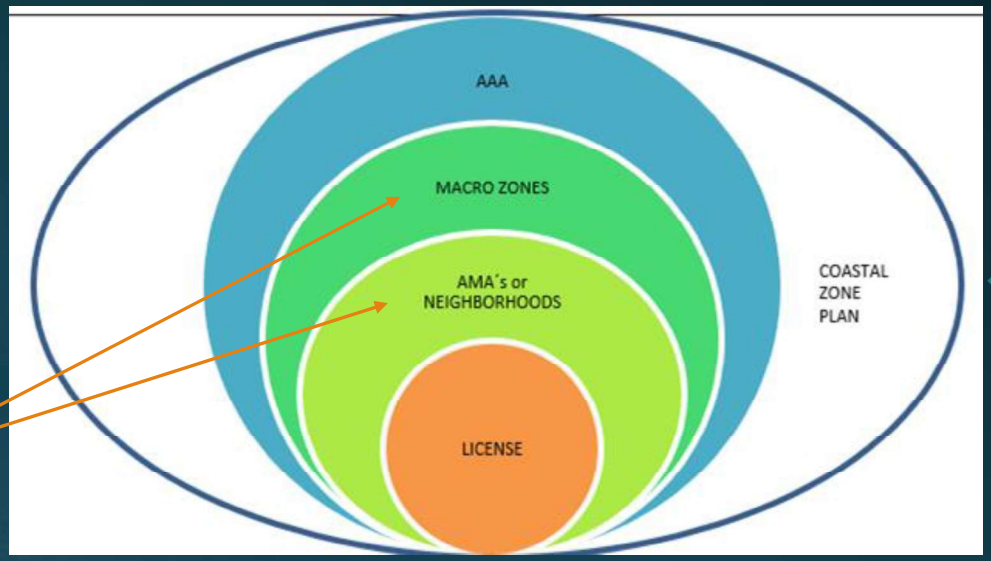
- **1994:** General Basis of Environment introduced EIA system in Chile **impacting also aquaculture.**
- **1995:** National Policy for the use of the Coastal zone, requests **coastal zoning plan** in regions to define areas of preferential use, including aquaculture.
- **2003** Aquaculture national policy objective: "to promote maximum economic growth of Chilean aquaculture along the time, in a framework of environmental sustainability & equity in access to the activity".
- **2008:** Coastal Marine Space for Indigenous Peoples (ECMPO) Law, established a legal tool to indigenous peoples allowing them **to claim coastal marine spaces** based on customary use.



PRESENT SPATIAL CATEGORIES

SPATIAL CATEGORIES DEALING DIRECTLY WITH AQUACULTURE

RELATED CATEGORY



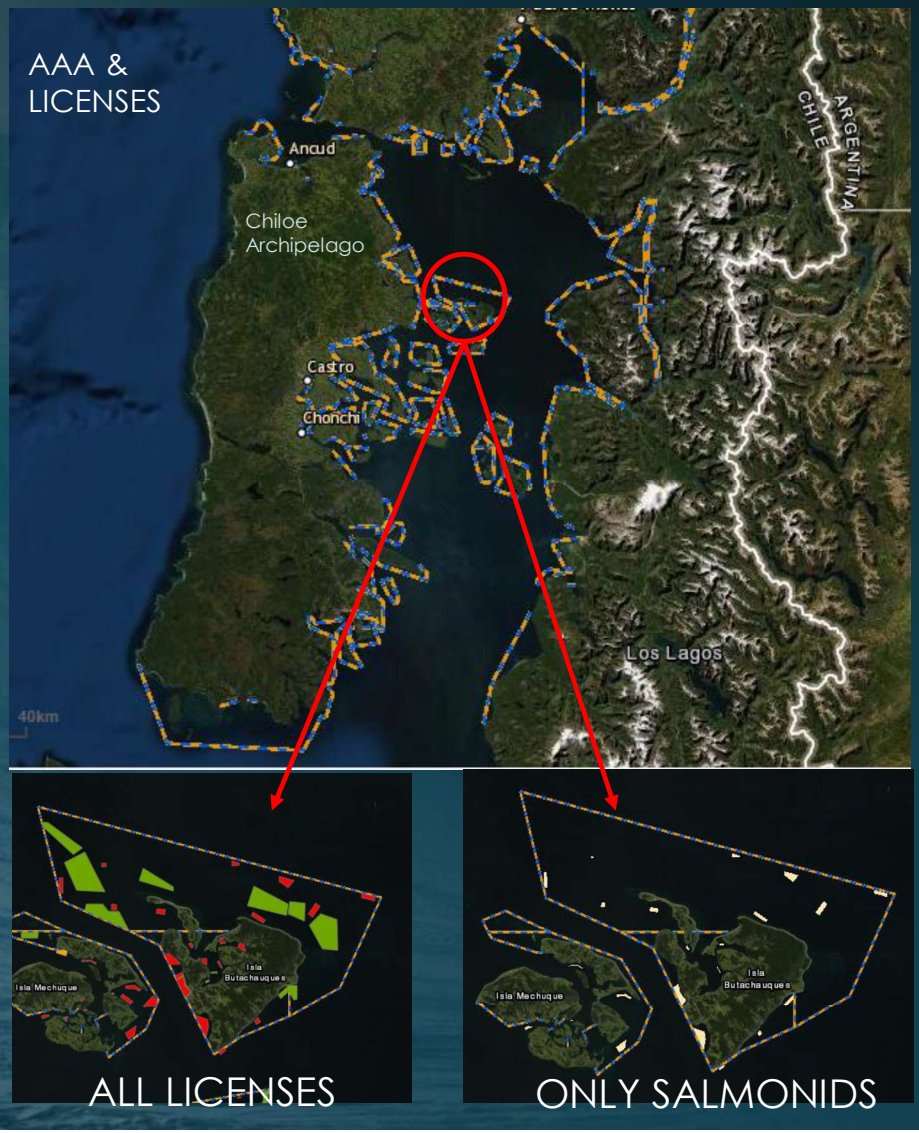
Only salmonids

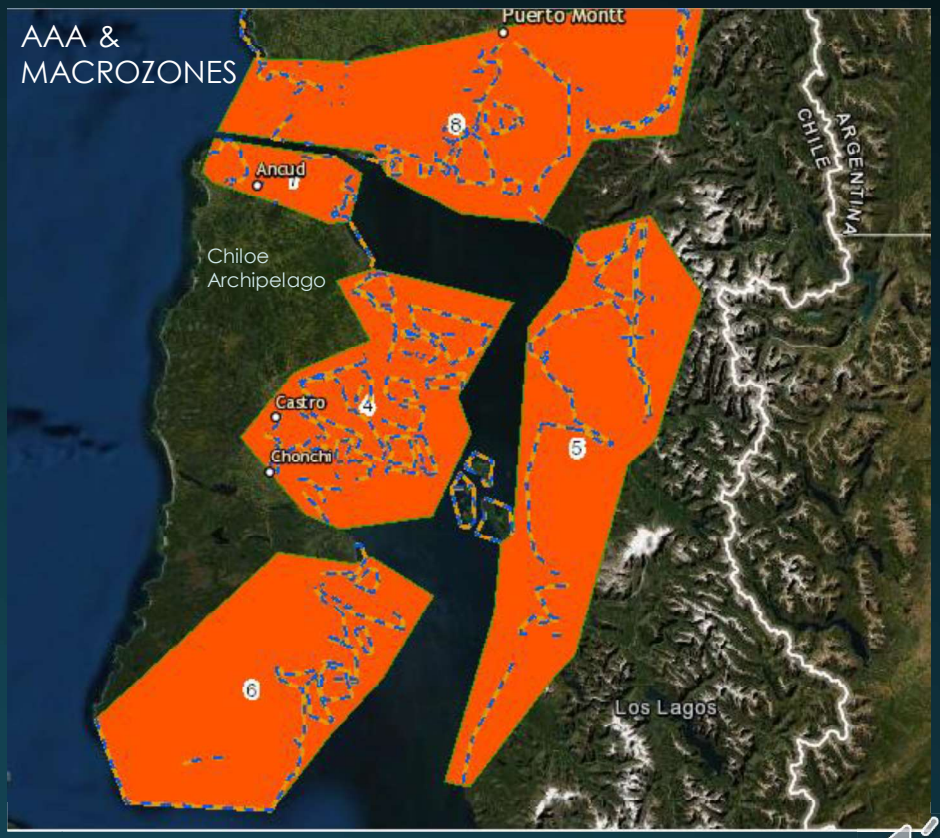
Originary people marine coastal territories (ECMPO)

3.- Regulatory & technical approach for aquaculture zones

Spatial distribution and basic regulations

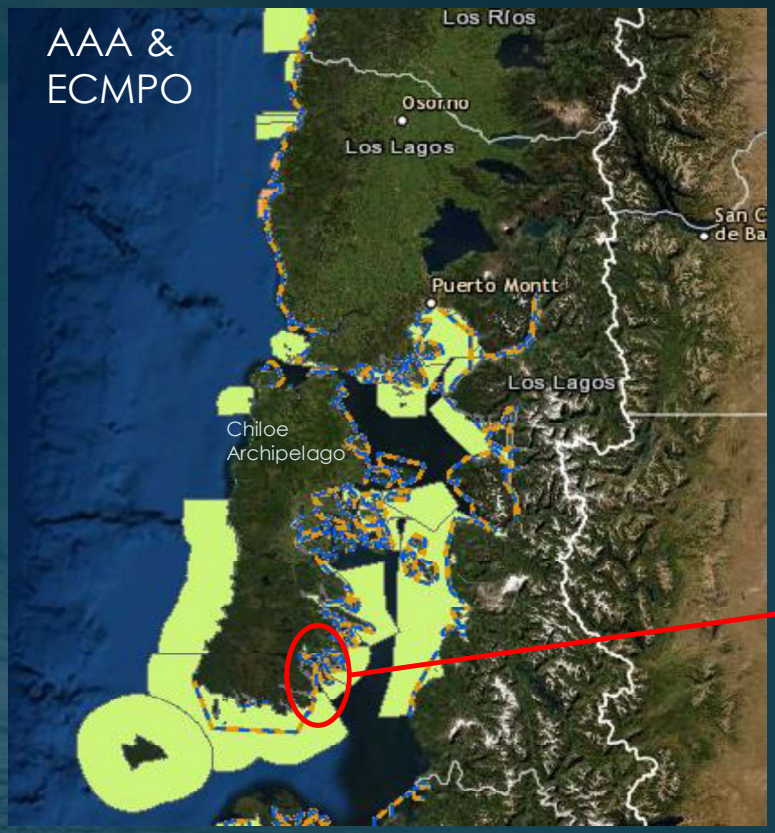
SPATIAL DISTRIBUTION OF LICENSES, AAA AND MACROZONES





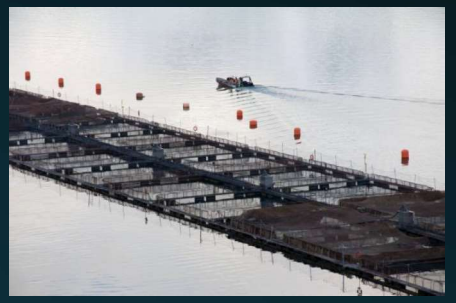
SANITARY MACROZONES

SPATIAL DISTRIBUTION OF LICENSES, AAA & ECMPO ZONES



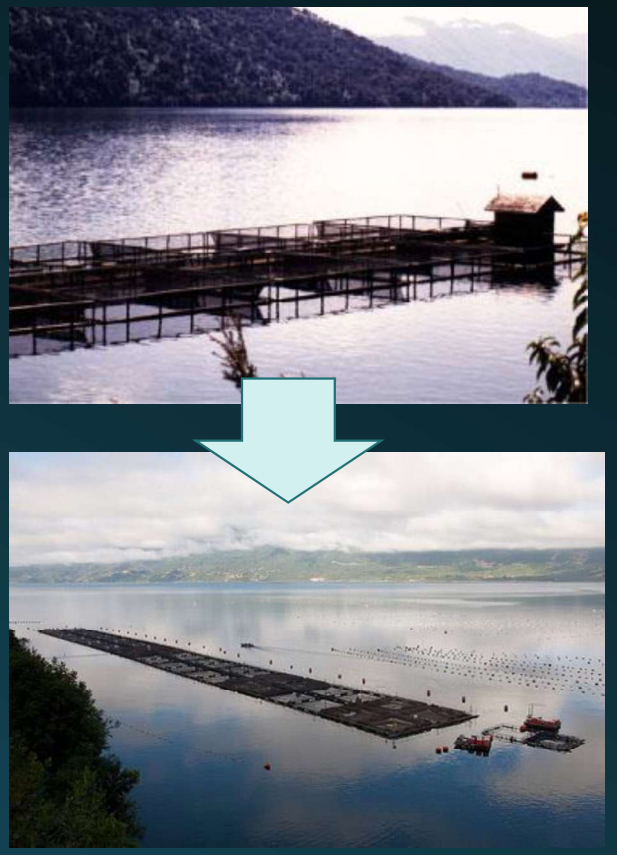
LICENSES OR CONCESSIONS

- A License or concession is the administrative act through which the National Ministry of Defense gives to a person, rights of use, for a period of 25 years renewable, over certain goods (like sea bottom, water column, beaches or land-beaches) to carry out in them aquaculture activities. Any aquaculture farm has to have an aquaculture **concession or license** to operate in the territory.
- There are **clear conditions** to keep the license & also for termination.
- Concessions and authorizations are **transferable and in general susceptible of legal business**, including leasing.
- No one can ask licenses for more than **20% of the total effective surface** included in an AAA.

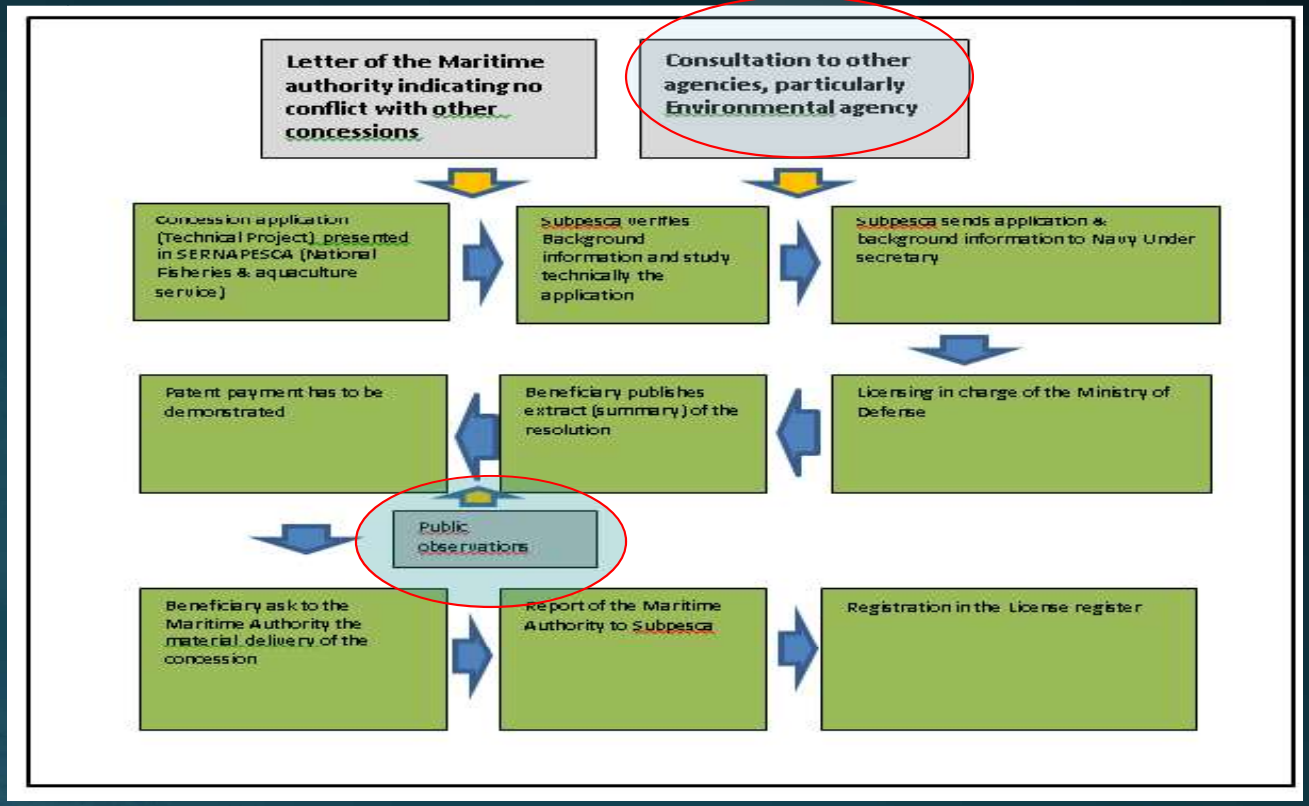


LICENSES OR CONCESSIONS

- A Preliminary characterization of the site (Baseline) is mandatory. **Minimum distance** between salmon farms is 1,5 nautical miles and 400 meters with any other farm.
- Historically site selection emphasized protection of bad weather effects & some general environmental requirements.
- Sites **were small** producing no more than 200 – 400 Ton/cycle. At present they produce around 1.500 – 2.500 ton.
- Initially the small-medium scale industry built **good relationship with local communities**. Progressively the industry massification and the arrival of executives/professionals without adequate induction opened **an increasing gap with community.**



LICENSES AUTHORIZATION PROCESS



License Approval procedure. A participative process

Administrative and legal requirements during operation: Strict enforcement and monitoring.

GROUP OF LICENSES (GOL) OR NEIGHBORHOODS)

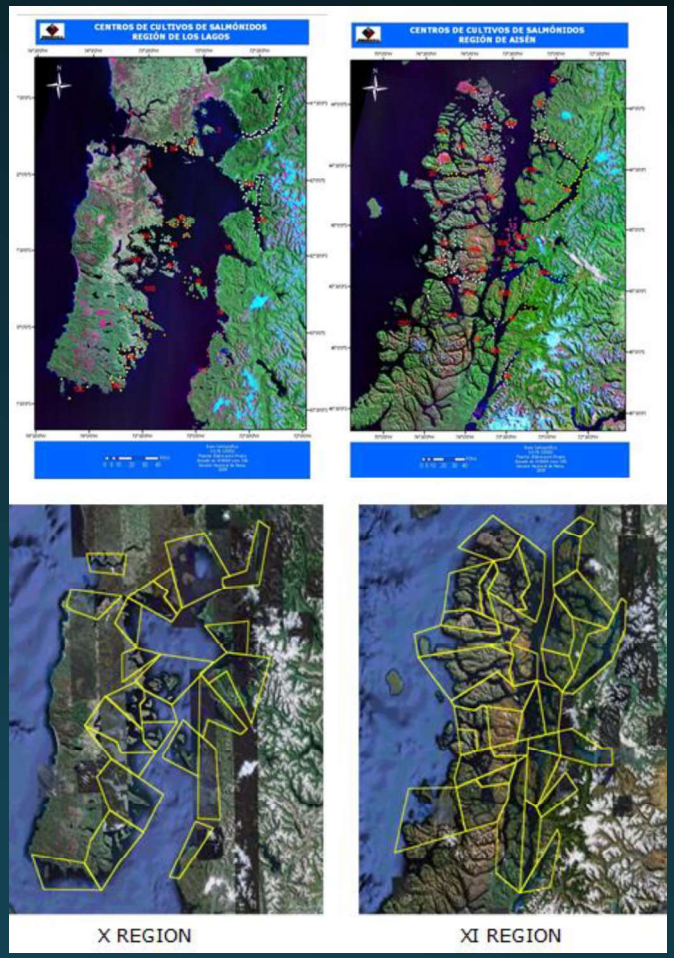
- The GOLs or neighborhoods were established **as a consequence of the ISA crisis** and were built under an essentially **veterinarian view**, emphasizing disease control and logistics aspects, more than a result of an environmental approach.

- Coordinated treatments and resting programs/group of licenses (or Neighborhood).

Table 2. Salmon AMA´s or Groups of licenses per region including number of licenses.

REGION	GROUPS OF CONCESSIONS	NUMBER OF CONCESSIONS
LOS LAGOS (X th)	25	505
AYSEN (XI th)	37	709
MAGALLANES	16	88

2017



MACROZONES

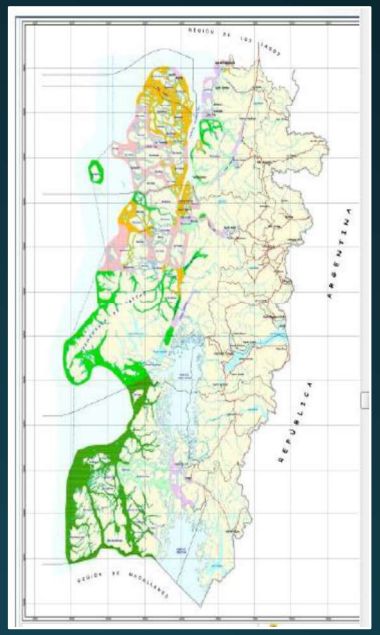
- Macrozones are established **to avoid dissemination of diseases under a sanitary emergency.**
- They are established by the Authority (SUBPESCA) with a minimum distance of **5 miles between them**, considering oceanographic and epidemiological models as well as logistic information.
- Macrozones include 2 or more GOLs. Their limits also consider availability of **coastal services** that allow boats transit without passing through other Macro zones.
- In front of a sanitary emergency immediately will operate a **restriction of boats transit** reinforcing macro zone isolation.

AUTHORIZED AREAS FOR AQUACULTURE (AAA)

AAA: Authorized Areas for aquaculture are defined as those geographic spaces situated on public use national goods where aquaculture can be developed.

AAA AND COASTAL PLAN ZONING

- All regions of Chile have AAA, except XVth, Vth and Metropolitan (RM). **Presently Xth, XIth and XII regions are closed** for new licenses, except seaweed.
- AAA ´s have been integrated under the **Coastal zone management plan** established in different regions.
- During the last 3 years **the AAA have been questioned,** principally by the Salmon Industry.
- **Small scale aquaculture** can be established by artisanal fishermen in their Areas of management and exploitation of benthic resources (max. 40% of their surface for this purpose).



4.- Science needs and resources associated with aquaculture zones

Present and projected

SCIENCE AND RESOURCES AT PRESENT

- Chile has high level **national and foreign science and technology centers** focused in aquaculture.
- Chile has emphasized capacity building & research in **fish health more than environmental issues**, spite of its importance in so complex system like Chilean Patagonia.
- In last years, principally after ISA crisis (2007-2009) emphasis has been put in **biomolecular and genetic studies** and techniques that helps **epidemiological studies and monitoring**.
- **Benthic environmental quality** has been prioritized given its importance in estimators of sites carrying capacity.
- Infrastructure, equipment, communication and digital technologies have been intensively introduced to support **offshore sea farming as well as RAS in freshwater, brakish water and salad water.**

Credit: Sitecna

SCIENCE AND RESOURCES NEEDS

- **Water bodies carrying capacity** still remains as a fundamental need and digital technologies can help to close this gap for the industry and Government.
- **Preventive tools to control disease**, diminishing still intensive use of therapeutants should be developed using bio - informatic and Information technologies.
- **Social sciences studies and monitoring** are fundamental for well supported integration plans with communities.
- **Transparency** has to be emphasized, informing indicators present and projected indicators using digital tech. & online tools.

Credit: Diario Concepción

Credit: Diari El Calbucano

5.- Lessons learned and future priorities.

Moving towards an ecosystem approach to aquaculture

LESSONS LEARNED

- **The Chilean salmon farming has shown an impressive growth**. In around 35 years the country became the leader as farmed trout producer and the second farmed salmon producer.
- **In general, regulations moved behind the industry growth** generating several gaps that did not help in preventing environmental/sanitary problems. In fact in 2007 the ISA crisis caused enormous impact on the industry with important social & economic consequences.
- This fact pushes for a rapid and profound change in regulations triggering **the spatial management that complement the initial Appropriated Areas for aquaculture (AAA) and Licenses.** Then Groups of licenses (GOLs or Neighborhoods) and Macrozones were established, among others.
- **These facts evidenced that aquaculture zone management approach** helps to minimize the risk of exceeding water bodies carrying capacity, disease dissemination and conflict with community and other users of the coastal zone.

FUTURE PRIORITIES

- **Presently an integrated spatial management system is in place** which spite of its weaknesses has contributed to coordinate efforts to control diseases, improve efficacy of measures in front of a sanitary risk and create better conditions for environmental/sanitary recovery of the macro zone.
- New licenses ban in the South of Chile, AAA review that would allow to relocate licenses in more exposed areas, development of offshore farms technologies and integrated models to anticipate environmental/sanitary risks will help to **gradually relocate operations out of conflictive areas in environmental, production and social economic terms**.
- Improvements have to be done to move closer to an **ecosystem approach to aquaculture, principally emphasizing carrying capacity studies and tools, interaction with communities and other sectors and also improving governance and participation.** Highest contribution of the GOL system has been the increase in social capital in the industry and the development of highest levels of public – private and academic interaction.