

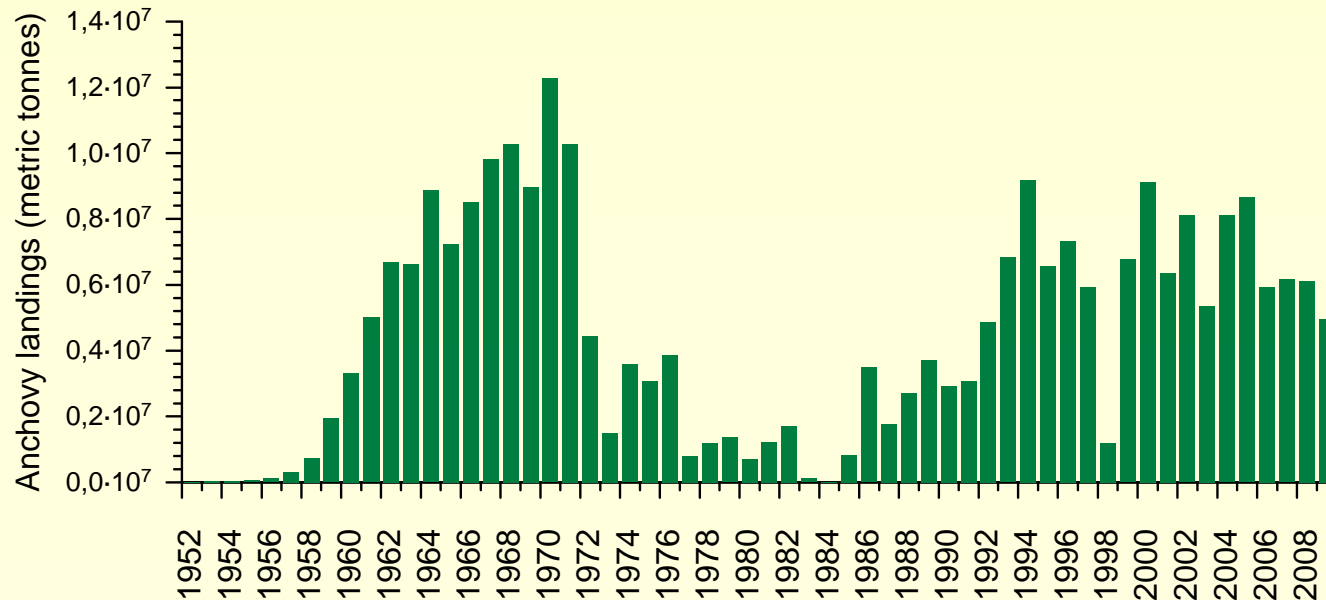
Adapting to climate change: lessons from the Peruvian pelagic fishery

Milena Arias Schreiber
Miguel Ñiquen Carranza
Marilú Bouchon Corrales



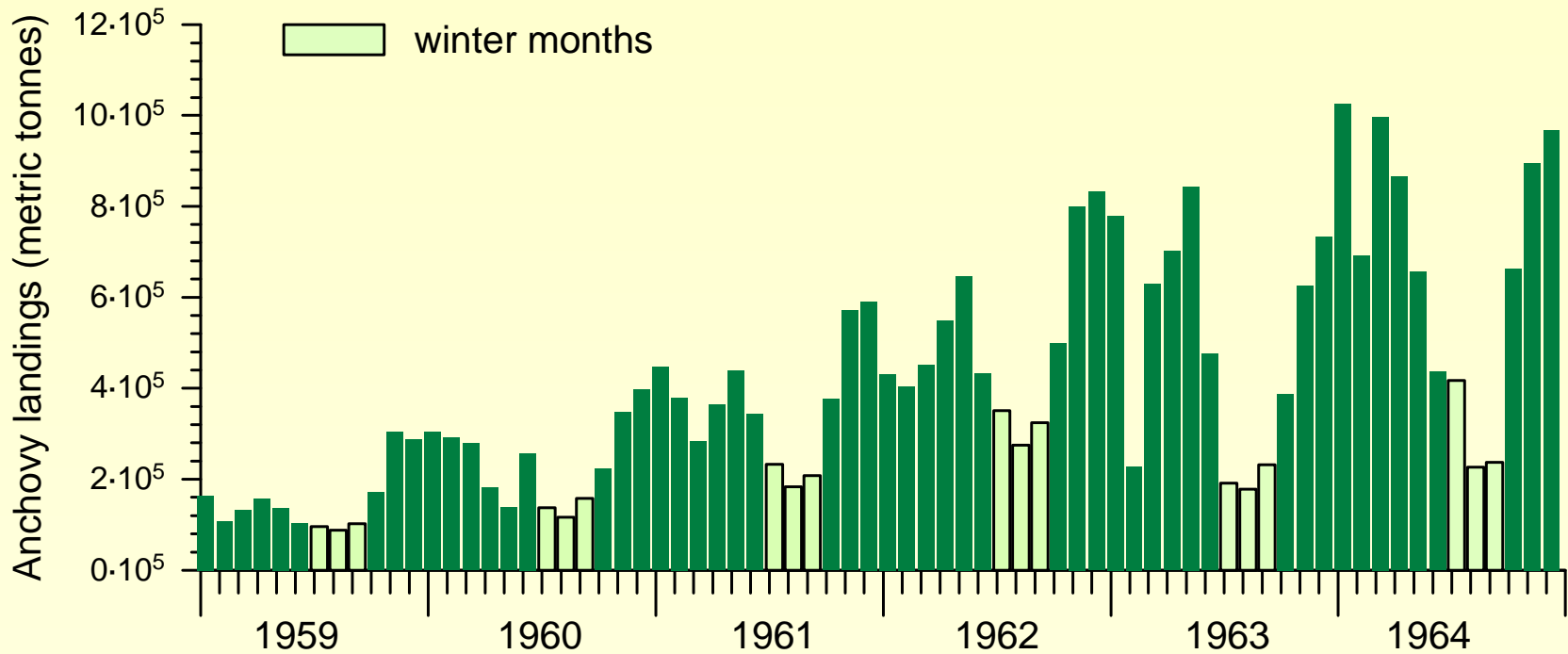
Peruvian pelagic fishery

- almost 10% of worldwide marine fisheries landings (FAO 2008)
- world's largest mono-specific fishery (99% of landings of one species)
- most sustainable fisheries worldwide (Mondoux et al. 2008)
- 99% of landings processed to fishmeal
- 1200 fishing vessels, 140 processing plants, 23000 employees, fishery management based on Total Allowable Catches, since 2009 by Individual Vessel Quotas



Peruvian pelagic fisheries bears:

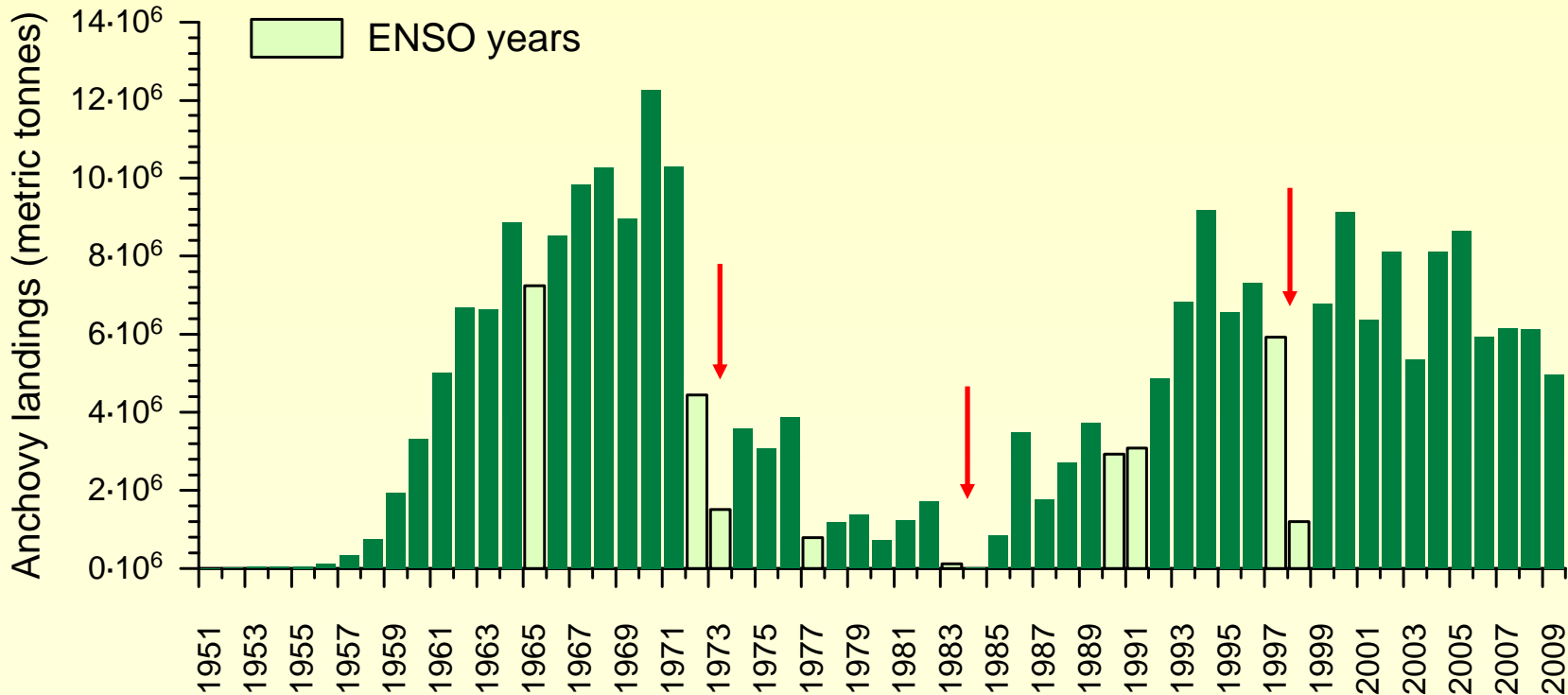
Seasonal variability



Strategy: since 1965 a **closed season** was established during the winter months when anchovy spawning reaches its peak

Peruvian pelagic fisheries bears:

Inter-annual variability



Extreme events:

ENSO 1972-73

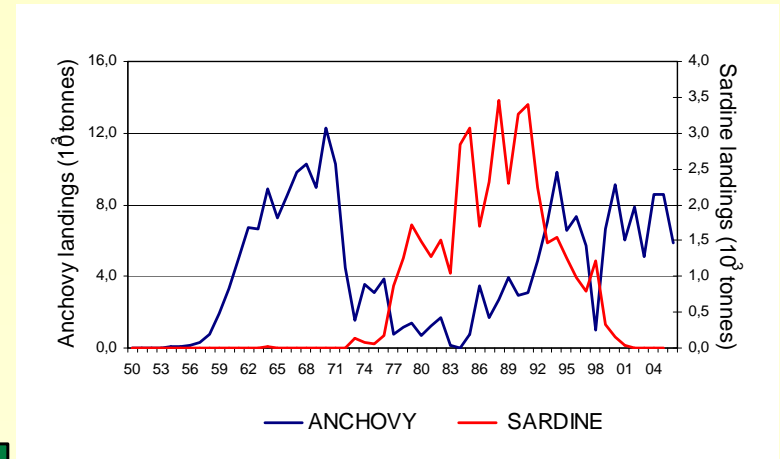
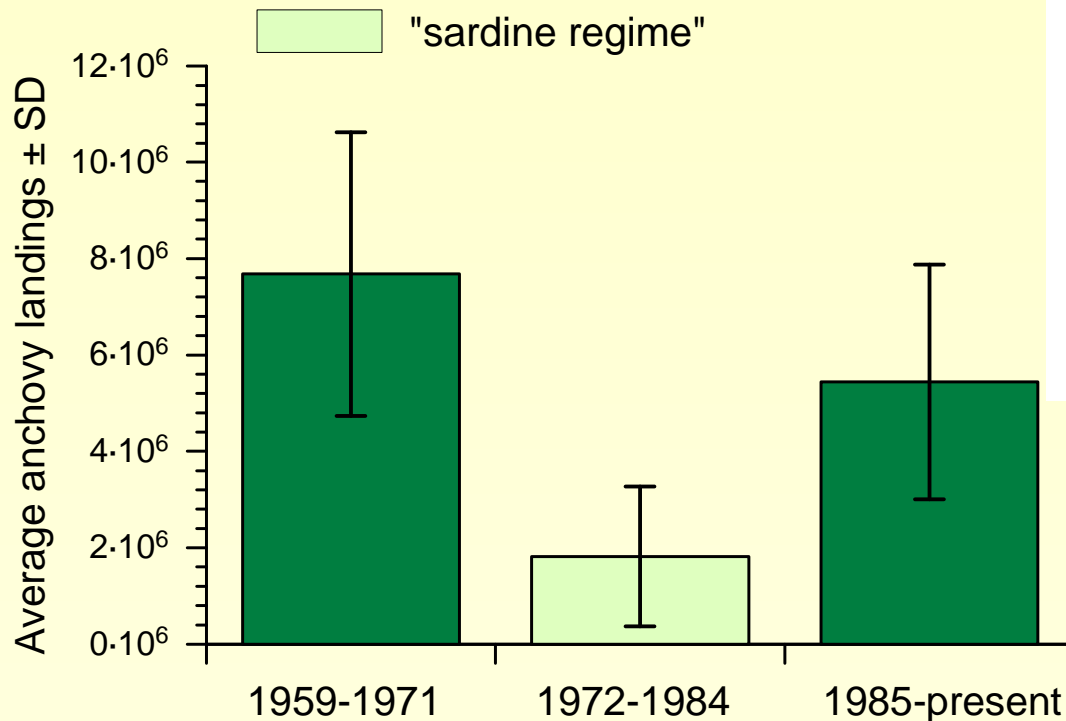
ENSO 1982-83

ENSO 1997-98

Strategy: at least four adaptations

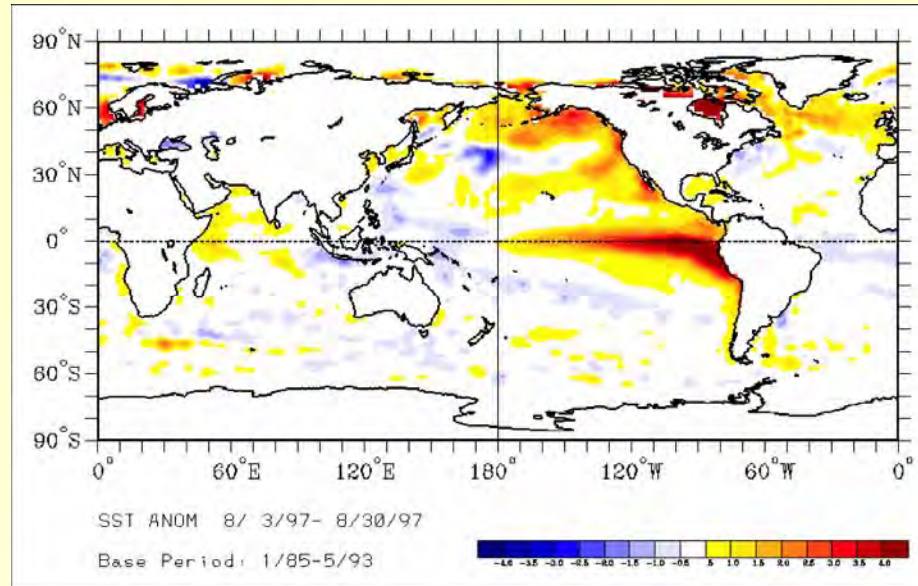
Peruvian pelagic fisheries bears:

Multidecadal variability or „regime shifts“:



First papers appear during present century, supported by paleo-oceanographic data (Alheit and Ñiquen 2004).

What happens during extreme ENSOs?

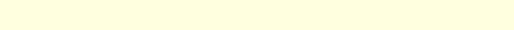
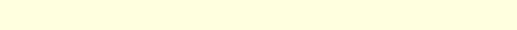
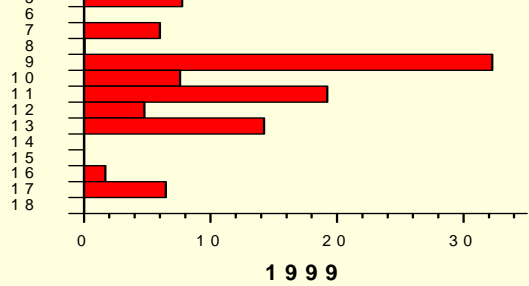
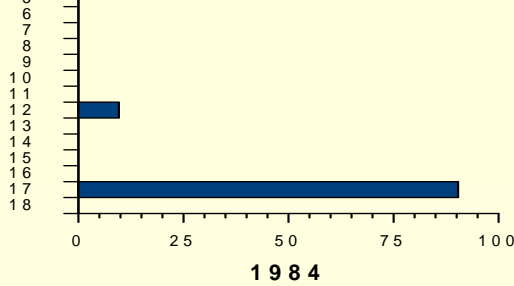
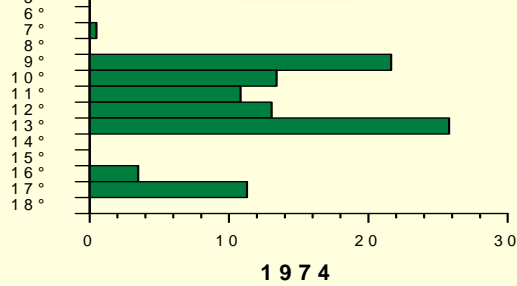
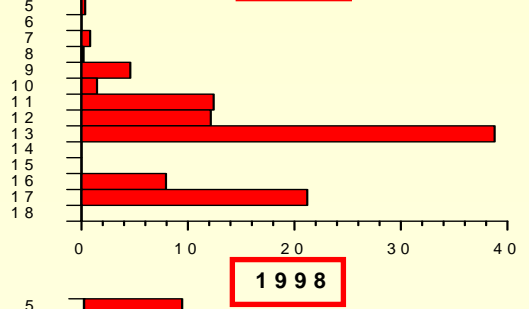
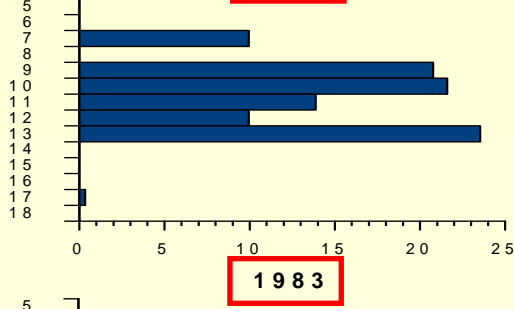
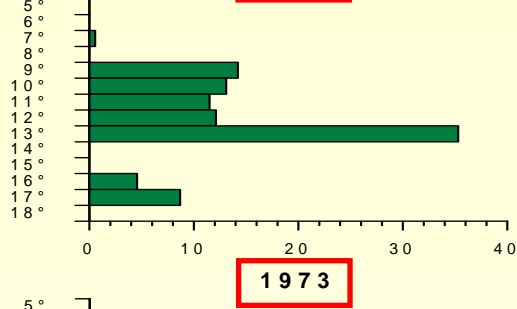
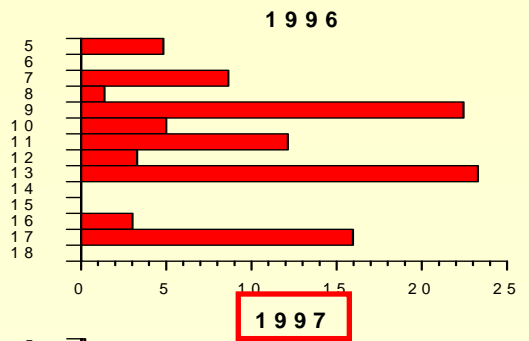
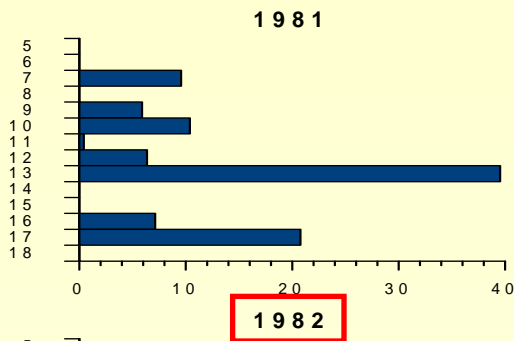
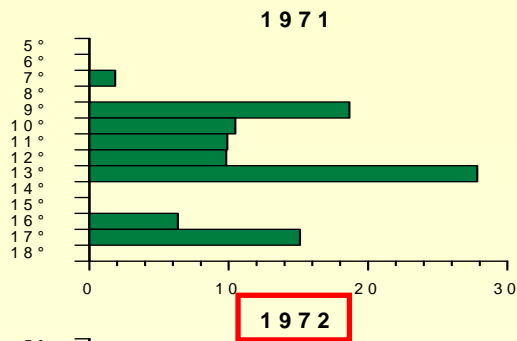
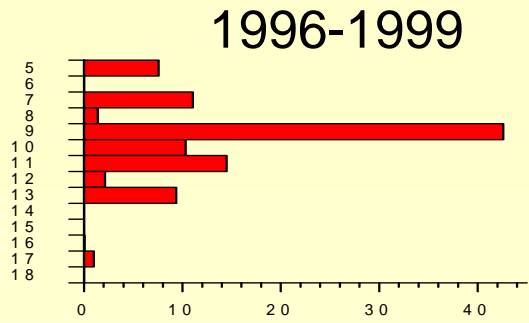
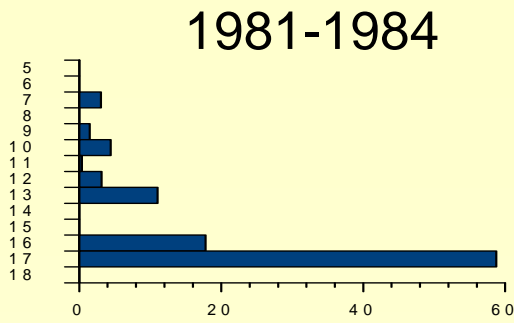
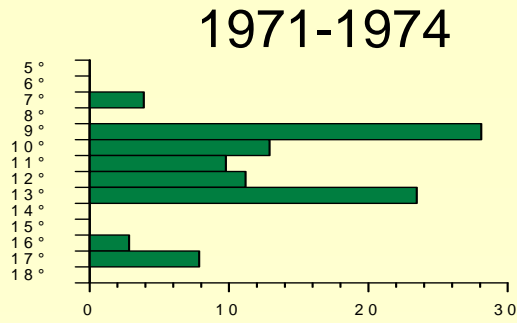


For the Peruvian anchovy fishery:

1. Migration of target species
2. Invasion of tropical fish species
3. Management plans (quotas, fishing season, etc) no longer valid
4. Export fishmeal price fluctuations

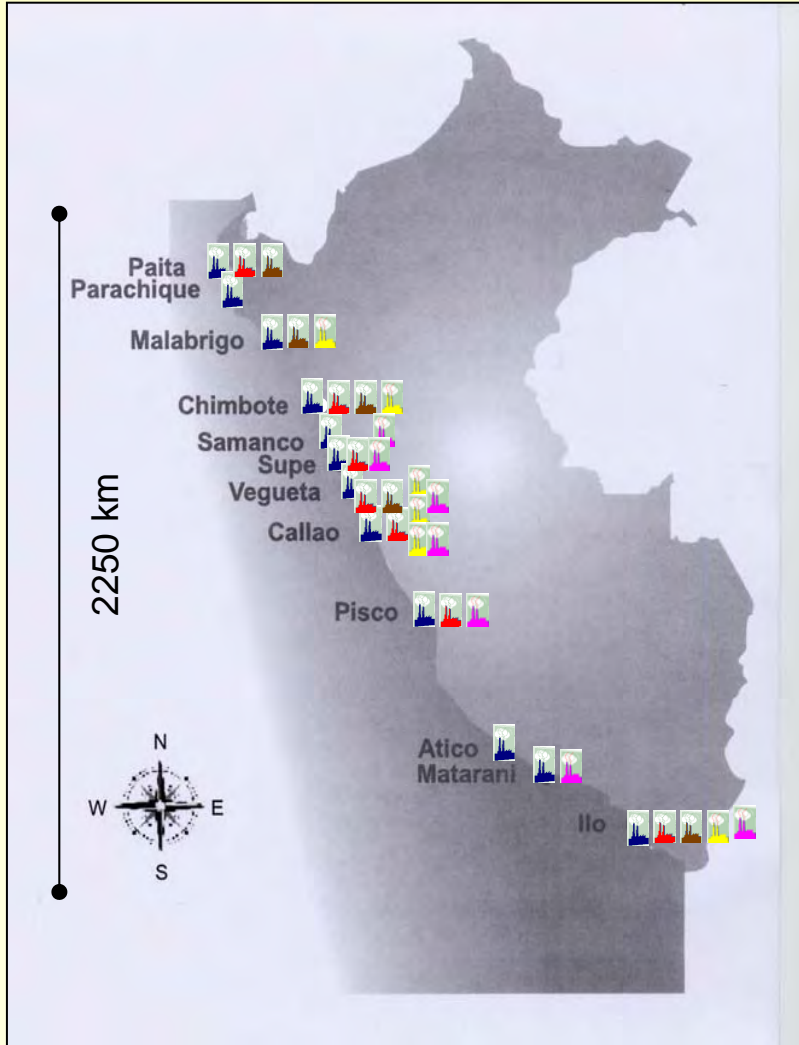
1. Migration of target species

Latitudinal range



1. Migration of target species

Adaptation: the decentralized industry



Tecnología de Alimentos S.A.

Pesquera Austral

Pesquera Copeinca

Pesquera Hayduk

Pesquera Diamante



Unloading platform

Fishmeal processing plants in Namibia



Fishmeal processing plants in the Gulf of Mexico



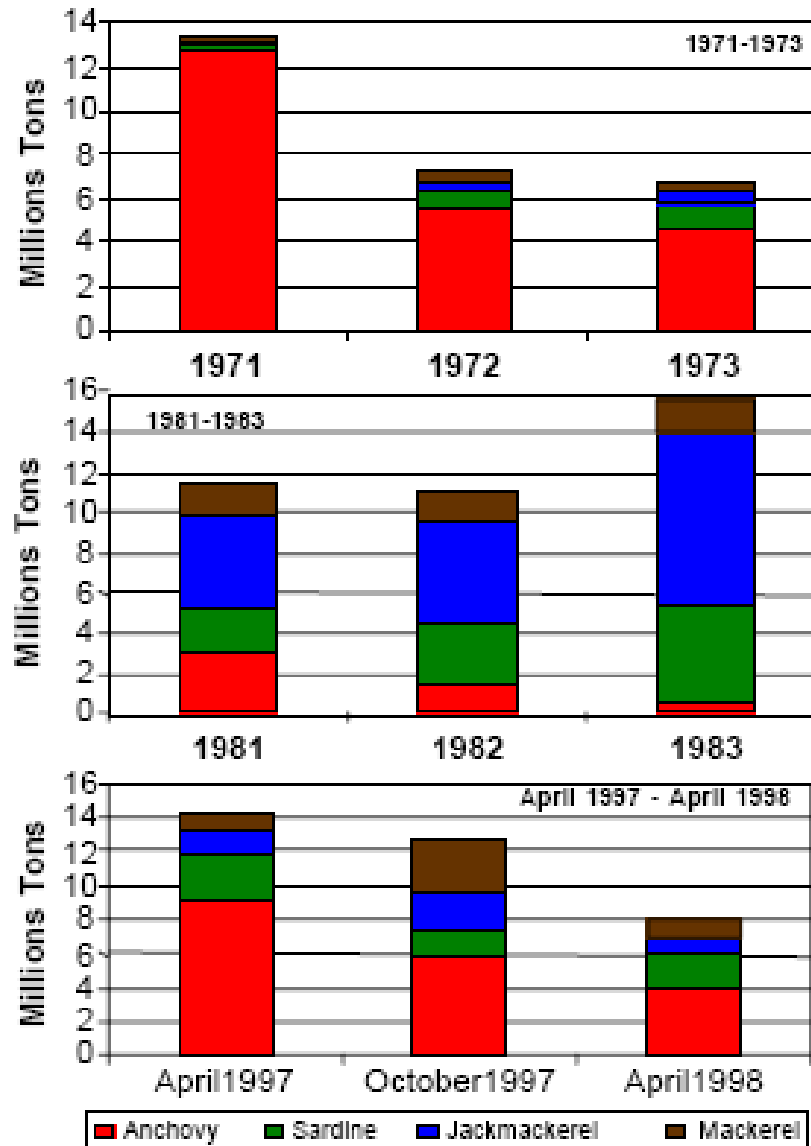
1. Migration of target species

Adaptation: low cost unloading facilities



2. Arrival of warmer water fish species

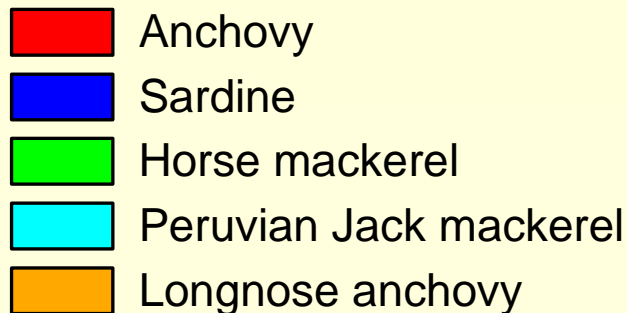
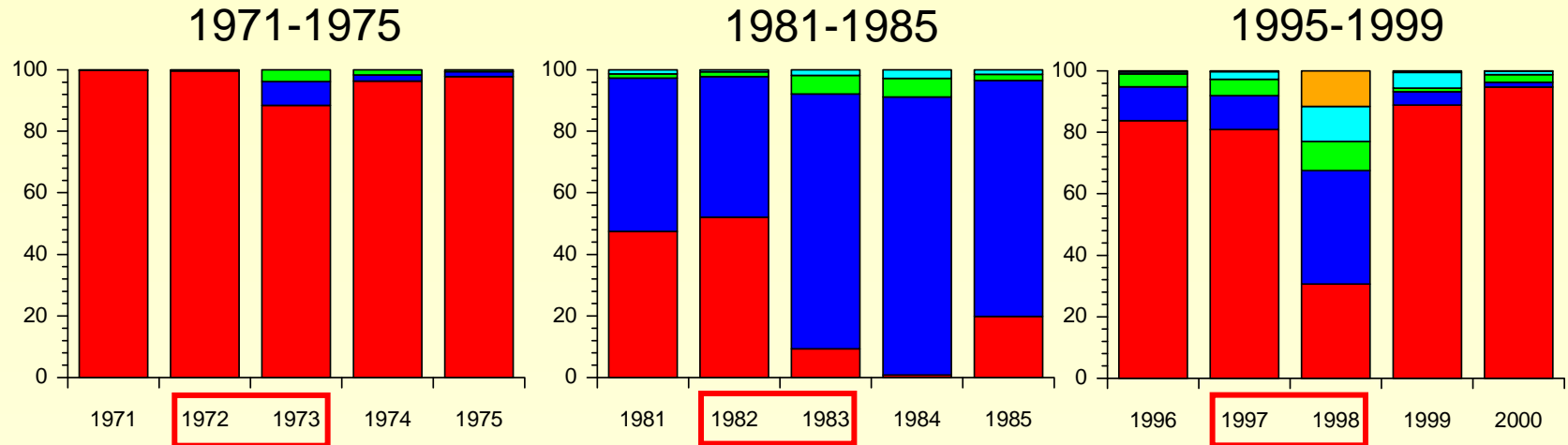
Biomass of pelagic species



2. Invasion of tropical fish species

Adaptation: the opportunistic industry

Landing's species composition



Fishmeal processing in comparison with human consumption industries, like the canning or frozen industry, has the major advantage of being independent of only one fish species for its production and marketing.

Since 2001 the use of human consumption fish species for fishmeal has been banned.

3. Management plans no longer valid

Adaptation: Flexible formal institutions

Peruvian General Fisheries Act (1992) requires the use of marine resources according to a management system based on current knowledge on biological, economic and social components.

Management plans:

- 2001 giant squid fishery
- 2001 and 2003 high migratory species (tuna) fishery
- 2001 and 2007 pelagic jack and horse mackerel fishery
- 2003 demersal hake fishery

The lack of a management plan for the anchovy fishery is not accidental or unintended but captures the intention of the government to avoid legal instruments that could restrict or delay a rapid management decision process.

Anchovy is managed according to “Provisional Fishing regimes” enacted without any approval of the parliament or the president with a solely signature of the Minister of Fisheries.

3. Management plans no longer valid

Adaptation: Rapid response

It takes two and a half days to close the anchovy fishery following written recommendations from the Peruvian Research Institute.



Resolución Ministerial

N.º 073-2010-PRODUCE

LIMA, 25 DE MARZO DE 2010

VISTOS: El Oficio N° DE-100-098-2010-PRODUCE/IMP del 24 de marzo de 2010 del Instituto del Mar del Perú – IMARPE, que remite el “Reporte de la Pesquería de anchoveta en la Región Sur del Litoral Peruano (del 01 enero al 23 de marzo de 2010); el Informe N° 229-2010-PRODUCE/DGEPP-Dchi del 24 de marzo de 2010 de la Dirección General de Extracción y Procesamiento Pesquero; y, el Informe N° 020-2010-PRODUCE/OGAJ-cfva del 24 de marzo de 2010 de la Oficina General de Asesoría Jurídica; y,

3. Management plans no longer valid

Adaptation: Rapid response

SE RESUELVE:

Artículo 1°.- Suspender las actividades extractivas del recurso anchoveta (*Engraulis ringens*) y anchoveta blanca (*Anchoa nasus*), a partir de las 00:00 horas del día siguiente de la publicación de la presente Resolución Ministerial, por un periodo de diez (10) días consecutivos en el área marítima comprendida entre los 17° 00' 00" (Mollendo) y el extremo sur del dominio marítimo del Perú.



L. LEMAH.

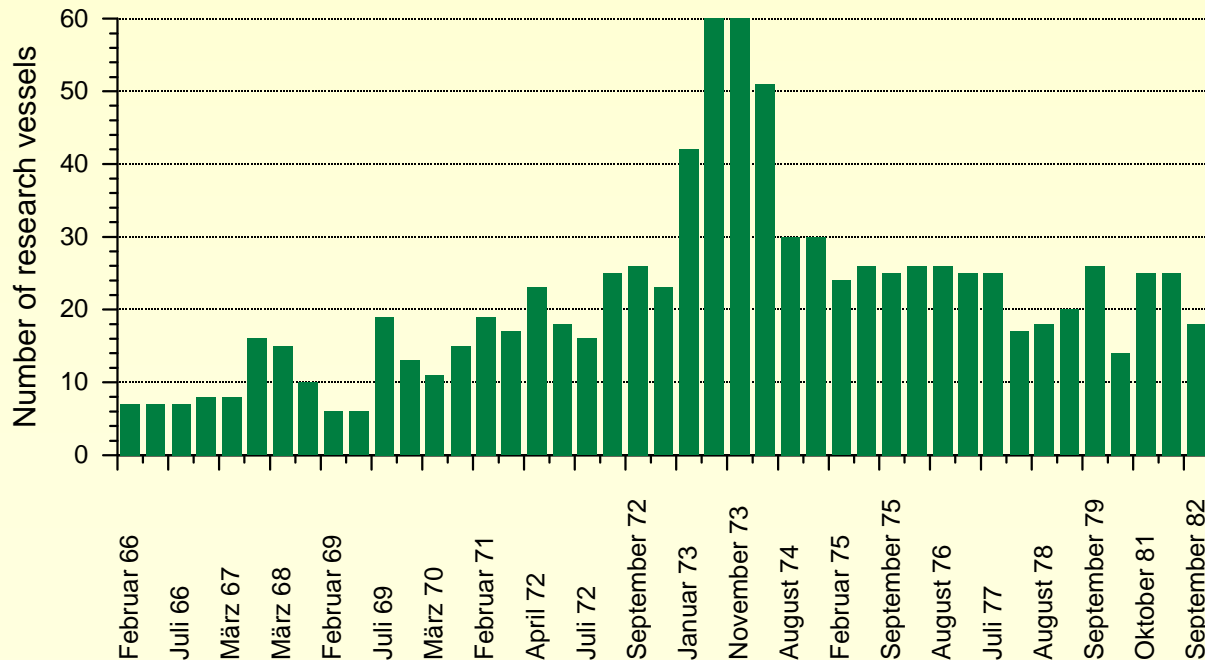
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Ministro de la Producción

3. Management plans no longer valid

Adaptation: Monitoring through Eureka operations

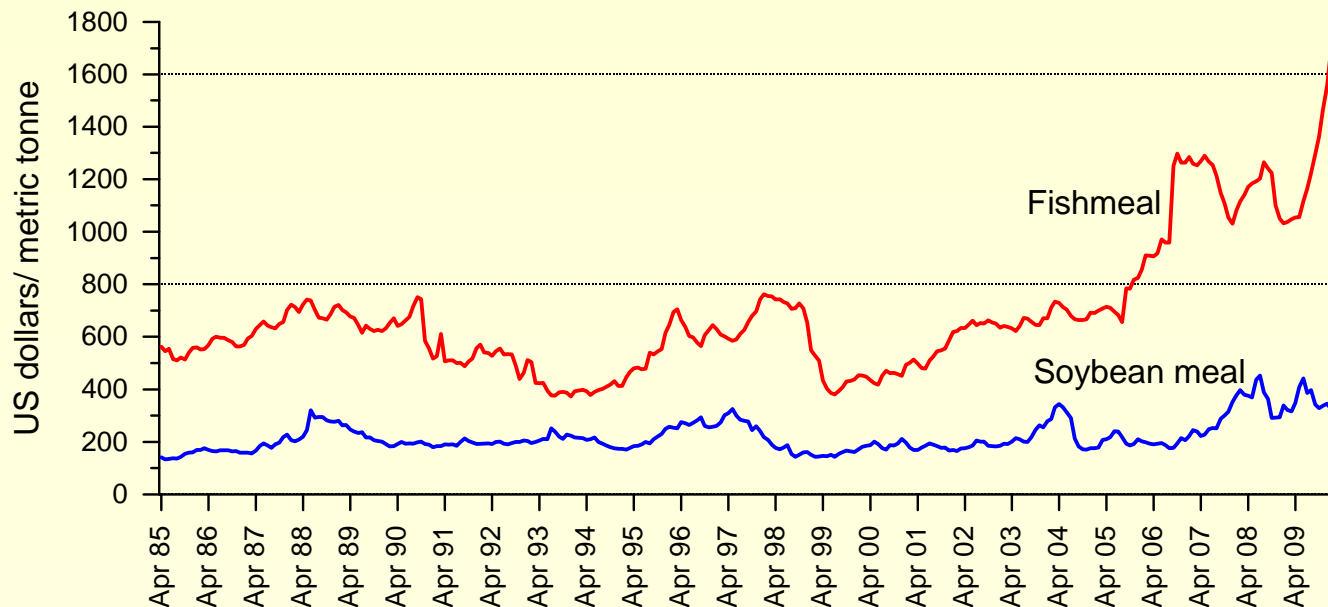
- Before 1982, monitoring was carried out through contractual arrangements between the Marine Research Institute and the fishing industry (Eureka operations).
- After 1982, at least 2 monthly cruises for anchovy plus Eureka operations.



4. Export fishmeal price fluctuations

Adaptation: Discounting external uncertainty

- Fishmeal prices in theory depend on the balance between demand and offer and should rise during extreme ENSO
- Fishmeal prices were depending also on soybean meal prices.
- 1990s started the industrial conversion in Peruvian fishmeal processing (from flame dried to steam dried)
- “Fair quality Meal” with 65% protein to “Prime Steam Fishmeal” with 68-72% protein content
- 2000, Peru was offering almost 1 million tonnes of Prime Steam Fishmeal



Synthesis

Commercial pelagic fisheries in Peru have developed strategies to cope with extreme ENSOs, which lead to substantial reduction of economic losses during the 1997-98 event.

Feeding fish, poultry or pigs with fishmeal will be remain economically attractive under future currently climate change scenarios and until there is not a significant change in strong cultural human consumption habits.

In the phase of SST increments in currently pelagic fishing grounds, governments should be prepared to be flexible and change their fishing policies adaptatively, rapidly and according to strong scientific and monitoring efforts.

To alleviate the impact of future uncertain climate scenarios in economic activities, additional human induced external uncertainties should be reduced or eliminated.

3. Management plans no longer valid

SE RESUELVE:

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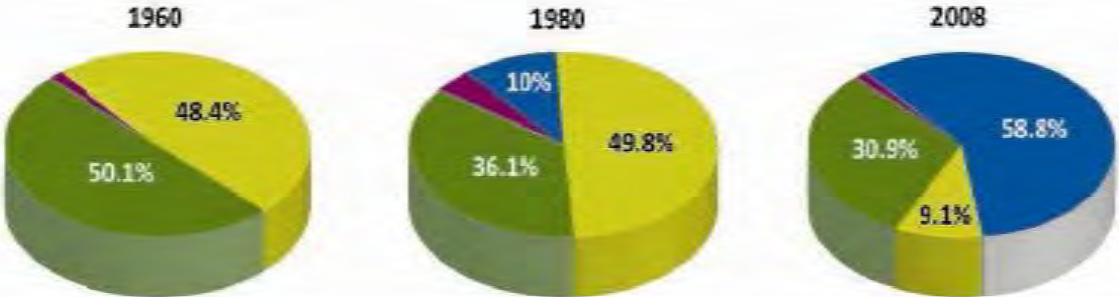


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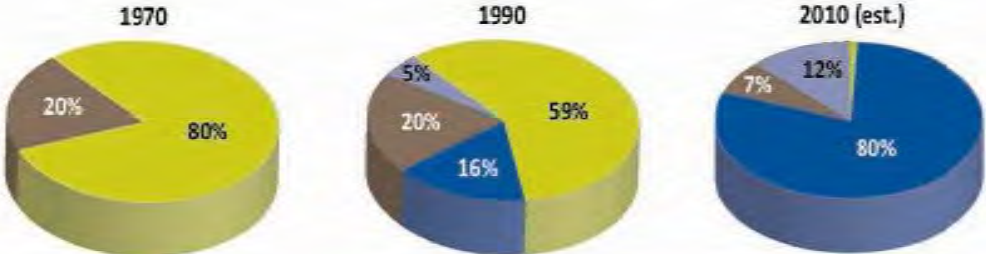

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Changing uses of fishmeal



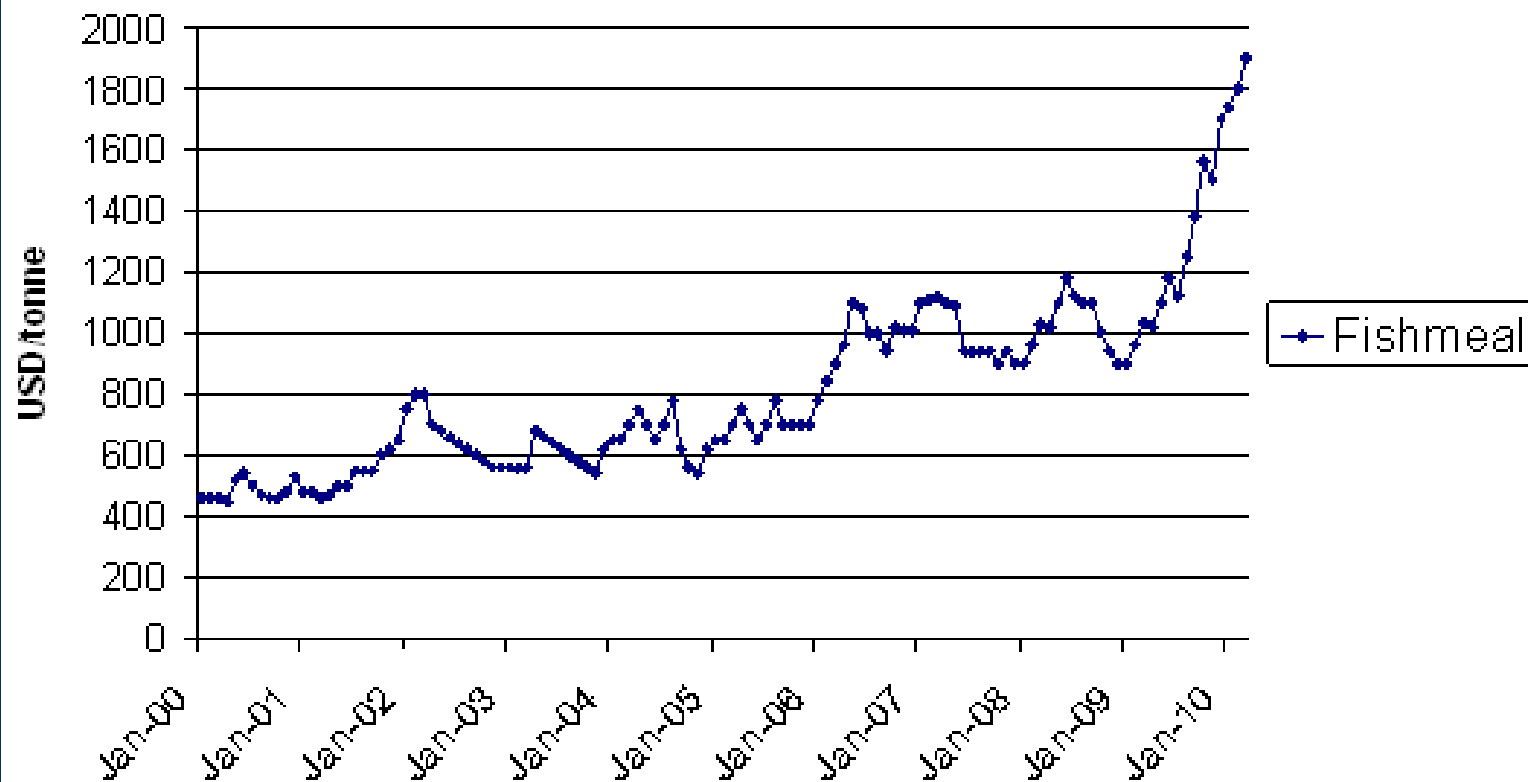
- Aquaculture
- Chicken
- Pig
- Other

Changing uses of fish oil



- Hardened edible
- Aquafeed
- Industrial
- Refined edible

Fishmeal prices in Chinese ports



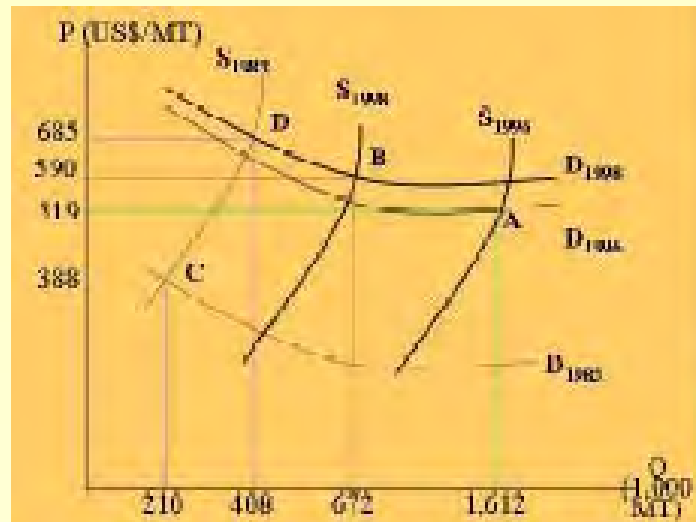


Fig. 6. The Peru's Fishmeal Export Supply and World Demand under El Niño in 1983 and 1998, and under a Normal Year in 1996

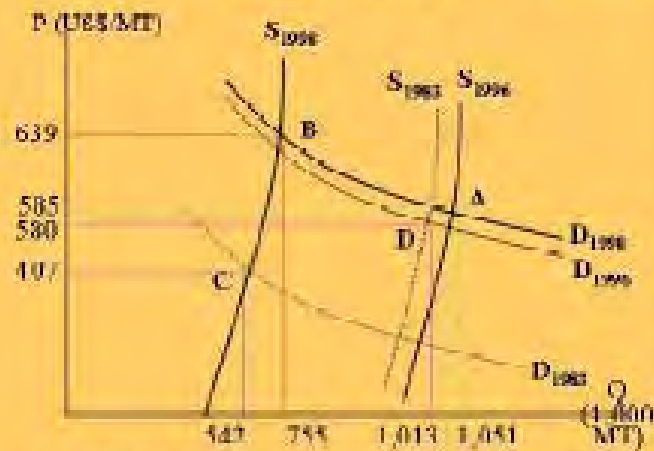


Fig. 7. The Chile's Fishmeal Export Supply and World Demand under El Niño in 1983 and 1998, and under a Normal Year in 1996



SE RESUELVE:

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Artículo 2.- El incumplimiento de lo dispuesto en la presente Resolución Ministerial será sancionado conforme al Reglamento de Inspecciones y Sanciones Pesqueras y Acuícolas (RISPAC), aprobado por el Decreto Supremo N° 016-2007-PRODUCE y demás normas concordantes, complementarias y/o ampliatorias.

Artículo 3.- Las Direcciones Generales de Extracción y Procesamiento Pesquero, de Seguimiento, Control y Vigilancia y de Asuntos Ambientales de Pesquería del Ministerio de la Producción, así como las Direcciones Regionales con competencia pesquera y la Dirección General de Capitanías y Guardacostas del Ministerio de Defensa, dentro del ámbito de sus respectivas competencias y jurisdicciones, realizarán las acciones de difusión que correspondan y velarán por el cumplimiento de lo dispuesto en la presente Resolución Ministerial.

Regístrese, comuníquese y publíquese.

JOSÉ NICANOR GONZALES QUIJANO
Ministro de la Producción

