

# 11. PROBABLE CHANGES IN THE CATCHES OF MAJOR COMMERCIAL SPECIES IN VARIOUS REGIONS OF THE WORLD OCEANS

The total catch dynamics of major commercial species is presented in Figure 11.1, with catches forecast from 2000. For the last 15 years (1985–2000), the total catch of the Pacific and Atlantic has decreased sharply (by almost 10 million tons). This is due to simultaneous decrease in the stock of six major commercial species (Japanese, Peruvian and European sardine, Alaska pollock, Chilean jack mackerel and Pacific salmon). The latter are in line with the dynamics of zonal atmospheric circulation (zonal ACI).

The decrease in commercial catches would be even more extreme if there was no gradual increase in the population of the meridional-dependent species: Pacific and Atlantic herring, South African sardine, and Japanese and Peruvian anchovy. After 2000, the present zonal ACI epoch will come into its final stage, and simultaneously, the new meridional epoch will start. Extrapolating from past experience (1950-1980s), commercial stock and catches of Pacific and Atlantic herring, Atlantic cod, South African sardine, and Japanese and Peruvian anchovy are likely to increase in line with the oncoming meridional epoch (2020–2030s). This will result in a gradual increase in the catches of "meridional-dependent" commercial species up to 23–24 million tons by the 2015–2020, followed by the decrease of up to 20 million tons by 2030. The stocks of zonal-dependent species will decrease gradually by the 2015–2020s, then start to increase, following the dynamics of "zonal" ACI, reaching its new maximum (about 23-25 million tons) by the 2040s. The opposite phase character of the total catch dynamics of "meridional" and "zonal" species is clear from Figure 11.2.

Changes in the catch of major commercial species in the Atlantic alone are less pronounced, and depend primarily on the dynamics of "meridional-dependent" species: Atlantic herring, Atlantic cod, South African sardine and anchovy. Hence, the catch dynamics of major commercial species in the Pacific is not very different from the corresponding dynamics of total catch summed for the Pacific and Atlantic (Figure 11.1).

Total catches of the major commercial species in the Atlantic are expected to decrease from 2020 to 2040. The contribution of zonal-dependent species to the total Atlantic catch is not high, and the expected decrease in "meridional-dependent" species is unlikely to be compensated fully by a corresponding increase in the catches of zonal-dependent species.

Differences between the total catch dynamics of the major commercial species in the Atlantic and Pacific are not well manifested (Figure 11.3). This is due to the "masking effect" of Peruvian anchoveta in the Pacific region where "zonal-dependent" species dominate.

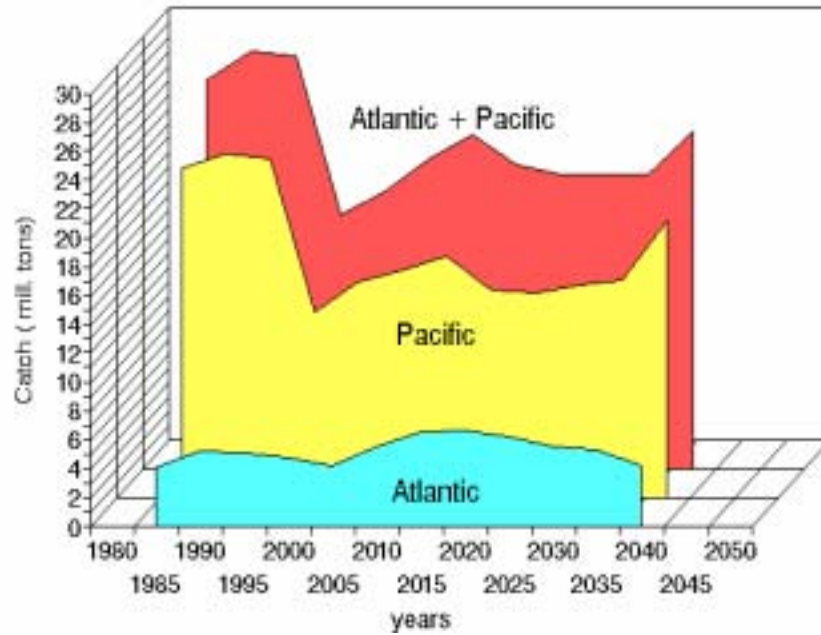


Figure 11.1 Observed and forecast total catch of major commercial species in the Atlantic and Pacific. Forecast catches are given for the period 2000-2040.

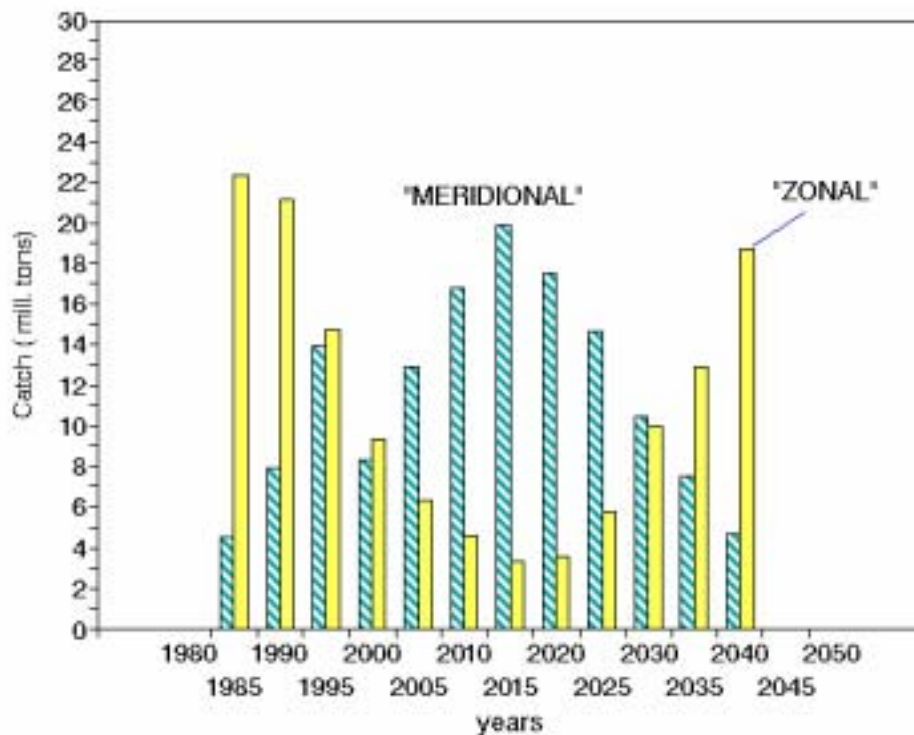


Figure 11.2 Total catch forecast for the major "meridional-dependent" (blue) and "zonal-dependent" (yellow) commercial species groups.

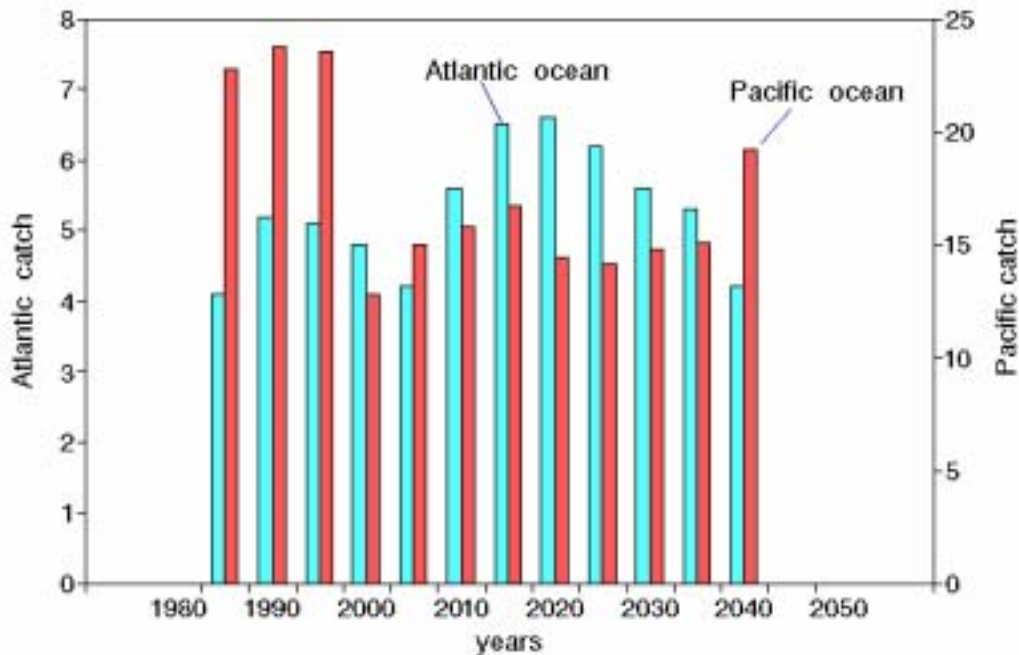


Figure 11.3 Catch changes forecast for the major commercial species in the Atlantic and Pacific.

If anchovy is withdrawn from the total Pacific catch, then the "out of phase" character of the catch dynamics in both oceans becomes clear (Figure 11.4). This "out of phase" character of the catch dynamics in the Atlantic and Pacific may be explained by the effect of the same global climatic process affecting both regions. In this system, the meridional-dependent commercial species dominate in the North Atlantic whereas zonal-dependent species dominate in the North Pacific. The total catch in these two regions fluctuates in agreement with the alternation of zonal and meridional climatic epochs. (Figure 11.5; see also Figures 3.6, 3.7)

The forecasted catch dynamics of major commercial species in the South Pacific and the South Atlantic are compared in Figure 11.6. Forecasted catch dynamics of the main commercial species in the Southern Hemisphere is to a large extent determined by the Peruvian anchovy catch, corresponding to "meridional-depending" dynamics with a maximum around 2015–2020s.

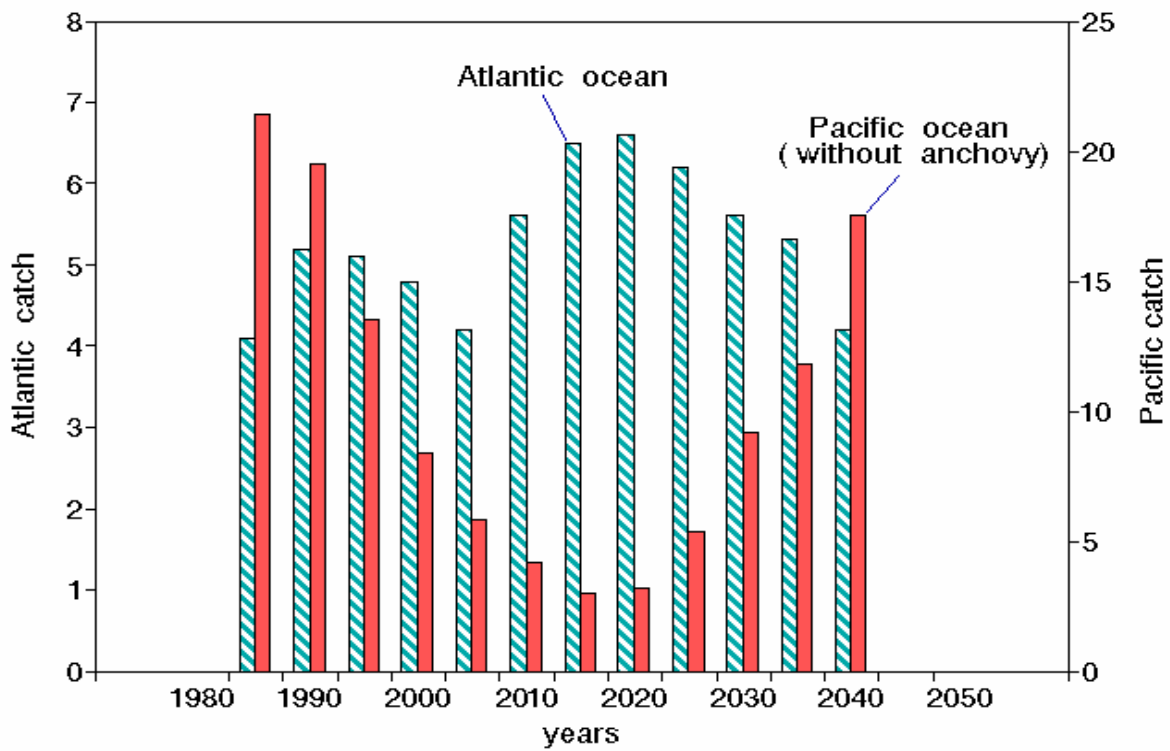


Figure 11.4 Forecasted catches of major commercial species in the Atlantic and Pacific (excluding Peruvian anchovy) for 2000-2040.

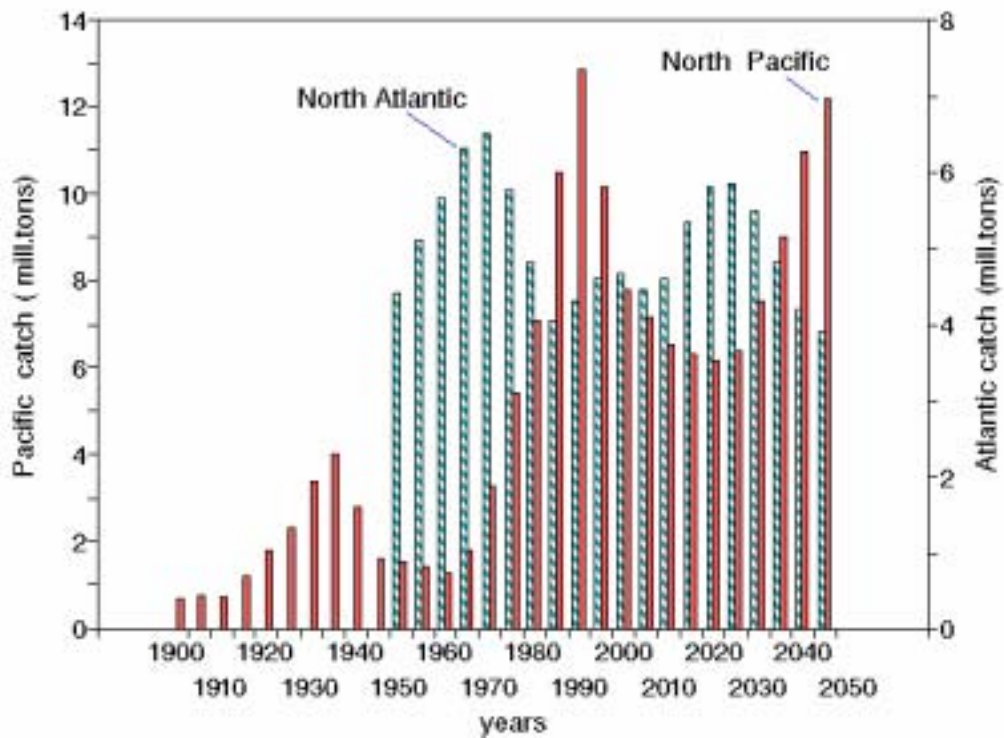


Figure 11.5 Actual (1920—1998) and forecasted (2000—2040) catches of major commercial species of North Atlantic and North Pacific.

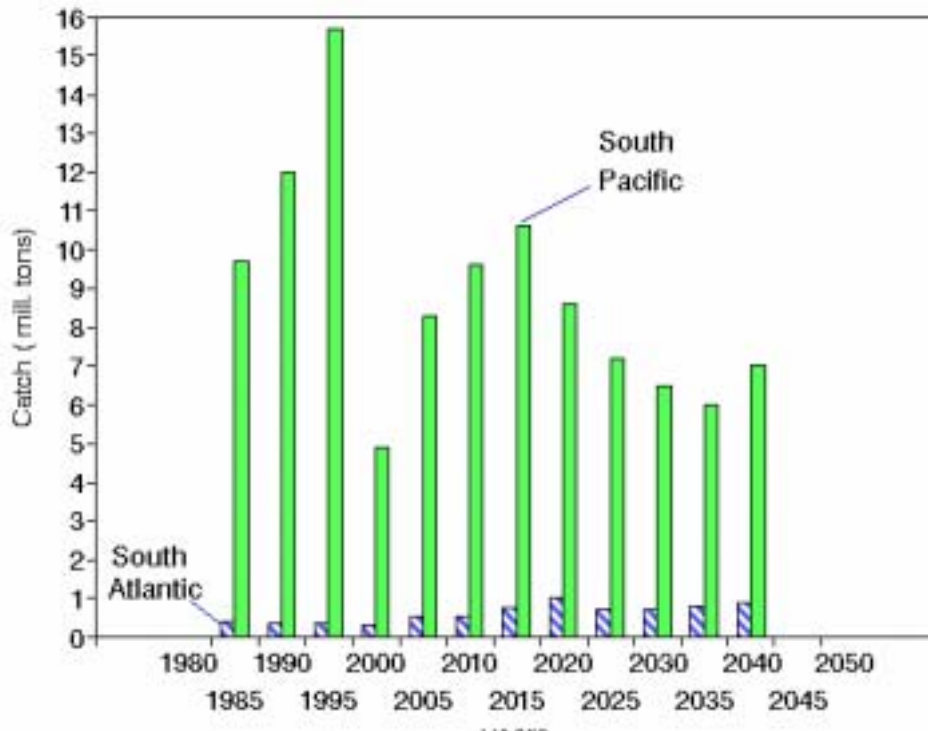


Figure 11.6 Forecasted catch dynamics of major commercial species of South Atlantic and South Pacific for 2000 – 2040.

### 11.1 PROBABLE CHANGES OF MAJOR COMMERCIAL SPECIES IN 2000–2040.

Table 11.1 Changes in catches (million tons) forecast for the major commercial species for 2005 - 2040 by 5 years intervals. The values indicate the change relative to the previous 5 years.

Years:	2005	2010	2015	2020	2025	2030	2035	2040
<b>World Catch</b>	+1.6	+2.2	+1.8	-2.2	-0.6	0	0	+3.0
<b>Atlantic Ocean</b>	-0.6	+1.4	+0.9	+0.1	-0.4	-0.6	-0.3	-1.1
<b>Pacific Ocean</b>	+2.2	+0.8	+0.9	-2.3	-0.2	+0.6	+0.3	+4.1

Table 11.1 presents the forecasted catch dynamics in the Atlantic and Pacific regions calculated over 5 years intervals. For our purpose, the most interesting are the catch changes expected in the next 15 years. Estimation of the annual increment suggests that, by 2015 the catches of major commercial species are likely to change as follows (compared to 2000):

- Total world catch: +5.6 million tons
- Atlantic catch: +1.7 million tons
- Pacific catch: +3.9 million tons

In the period of 2015–2030, the catches will change as follows (compared to 2015):

- Total world catch: -2.8 million tons
- Atlantic catch: -0.3 million tons
- Pacific catch: -2.5 million tons

In general, the catches forecast for the major commercial species in both oceans will increase in the 2000-2015s and decrease in the 2015-2030s. This is due to the expected increase of the meridional-dependent catch in the Atlantic Ocean and probable increase in Peruvian anchovy catch in South Pacific. At the same time, in the most important fishery region, the North Pacific, the catch of the major commercial species is expected to decrease significantly due to a long-term decline in zonal-dependent species abundance.

The long-term catch fluctuations depend primarily on the variation of only 12 major commercial species, which are strongly influenced by climatic effects. The total world marine catch includes many more species. Around 550 fish species are caught commercially. The catch of these species has remained relatively stable (about 35 million tons) for the last 20-25 years is not expected to be so influenced by climate. Therefore, changes in total catches will reflect changes in the 12 major commercial species only.