Too Few Fish

A Regional Assessment of the World's Fisheries

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Too Few Fish: A Regional Assessment of the World's Fisheries.
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For millennia, the world's expansive oceans have served as a vast food source for the planet. Unfortunately, overfishing now gravely threatens the ability of the oceans to continue in this essential role.[1] Helping to fuel this crisis is a highly subsidized global fishing fleet that by some estimates has more than twice the fishing power needed to fish the oceans sustainably.[2]

Humans are now capable of finding and capturing marine resources in the most productive habitats around the world, and have done so better than ever before. As a result, we can no longer expect to find any hidden reserves of fish. In fact, many scientists have warned of impending collapses in fish populations within decades. While the exact timing may be debatable, the trend is not — and new stresses, including most notably, climate change, threaten to make the situation worse and occur faster than we project.[3] As the United Nations Food and Agriculture Organization (FAO) points out, "the maximum long-term potential of the world marine capture fisheries has been reached."[4]

We can no longer expect to find any hidden reserves of fish

The World's Fisheries

The FAO has reviewed 584 fish stocks and species from oceans around the world. Sufficient information has been available for the FAO to assess the health of 76% of these stocks and species. The FAO found of the fish stocks and species it has assessed, more than three quarters are fully exploited, overexploited, depleted or recovering — and, therefore, can no longer sustain expansion of the fishery. Furthermore, expansion of fishing activity is extremely risky in those stocks with an unspecified or unknown status.

Consequently, only 17% of the world's fisheries should be considered capable of any growth in catch at all.

Some regions are even more heavily fished.

- In six FAO regions, accounting for more than 50% of the total global catch in 2005, at least 85% of stocks are already fully fished or overfished.[5]
- In the western central Atlantic, the northeast Atlantic, the eastern central Atlantic and the western Indian Ocean, more than 95% of fish stocks cannot sustain any further expansion in fishing.

Fisheries Subsidies and Overfishing

Despite the clear warnings to reduce fishing pressure, governments continue to provide significant subsidies that promote fishing beyond biologically safe limits, even when it is not economic to do so. Such subsidies and the fishing activity they enable result in overexploited fish populations, undermine fishing control programs, and prevent depleted fish populations from recovering. The resulting impacts on ecosystems have long term consequences for coastal communities, food security and economic development.

This report highlights the essential need to address fisheries management and sustainability as part of any new rules to control subsidies

In short, the world's oceans can no longer afford subsidized fishing. Members of the World Trade Organization (WTO) are currently trying to reach an agreement to reduce subsidies that contribute to overcapacity and overfishing, an action that is now urgent.

In describing the poor state of most of the world's fisheries, this report highlights the essential need to address fisheries management and sustainability as part of any new rules to control subsidies. Without such measures, the WTO goals of enhancing the mutual supportiveness of trade and the environment cannot be attained.

Methodology

What follows is a compilation and review of FAO data and reports on the status of fish stocks around the world. It provides a global perspective on the state of the world's fisheries resources, followed by a region by region analysis. In particular, it focuses on the scope for further growth in fisheries (or the lack thereof) in the different regions of the world.

The data should be understood in the context of the difficulties associated with both data collection and reporting across a wide range of management regimes and capabilities. Verifying what is caught, and where, remains a significant challenge for many countries, and in some countries there is considerable under-reporting or over-reporting of catch.[6]

Data is gathered by the FAO from member countries and institutions, and the contributions vary based on each country's and regional institution's level of monitoring and management for commercial catch and landings. The FAO relies solely on the statistics from member countries, even if they are of doubtful accuracy. Misreporting by countries with large fisheries, when combined with large and widely fluctuating catch of species such as Peruvian anchoveta, can cause true trends to be misunderstood.[7]

Furthermore, FAO statistics do not include and account for landings from sport, artisanal and other under-reported and illegal catches. Finally, catch statistics are aggregated into largely arbitrary "ocean areas" rather than into marine ecosystems. Catches reported for species in one FAO defined "ocean area" may straddle these arbitrary boundaries, and migratory species such as tuna, swordfish and sharks range over multiple areas, complicating assessments of stock status.

It should also be noted that many of the world's stocks have not been assessed by the FAO.[8] While a substantial amount of information is available for important stocks exploited by large scale industrial fishing, little or no official FAO information exists for a very large number of smaller coastal stocks (e.g., exploited by small-scale fisheries) or very deep sea stocks exploited without control far away from the coasts (e.g., on sea-mounts).[9]

Conclusions and Recommendations

The depletion of fish stocks violates the basic conservation requirement of the 1982 UN Convention on the Law of the Sea as well as every tenet of sustainable development. It is also contrary to the principles and management provisions adopted in the 1995 FAO Code of Conduct for Responsible Fisheries. Overfishing affects the structure, functioning and resilience of the ocean ecosystem, threatens food security and economic development, and reduces long-term social welfare.

Until recently, as fishermen have found new resources to exploit — either further down the food chain, further away or deeper in the ocean — an appearance of plenty has been maintained for those in developed countries. But this illusion hides the reality that the vast majority of stocks are exploited at or beyond their maximum sustainable potential. Without effective management and restraints on incentives to fish, even the few stocks with potential room for expansion are doomed to overexploitation.

The need to control fishing effort and capacity is essential to achieving sustainable catches from the world's oceans, with the resulting economic and development benefits that would follow. But global subsidies, amounting to approximately 25 percent of the landed value of fish, undermine management efforts by supporting uneconomic and unsustainable fishing activity.

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The World Trade Organization has a critical window of opportunity now to make a major contribution toward economic development and the sustainability of the oceans by prohibiting the use of subsidies that contribute to overcapacity and overfishing.

It is time to make a WTO agreement on the reduction of fisheries subsidies a global environmental priority.

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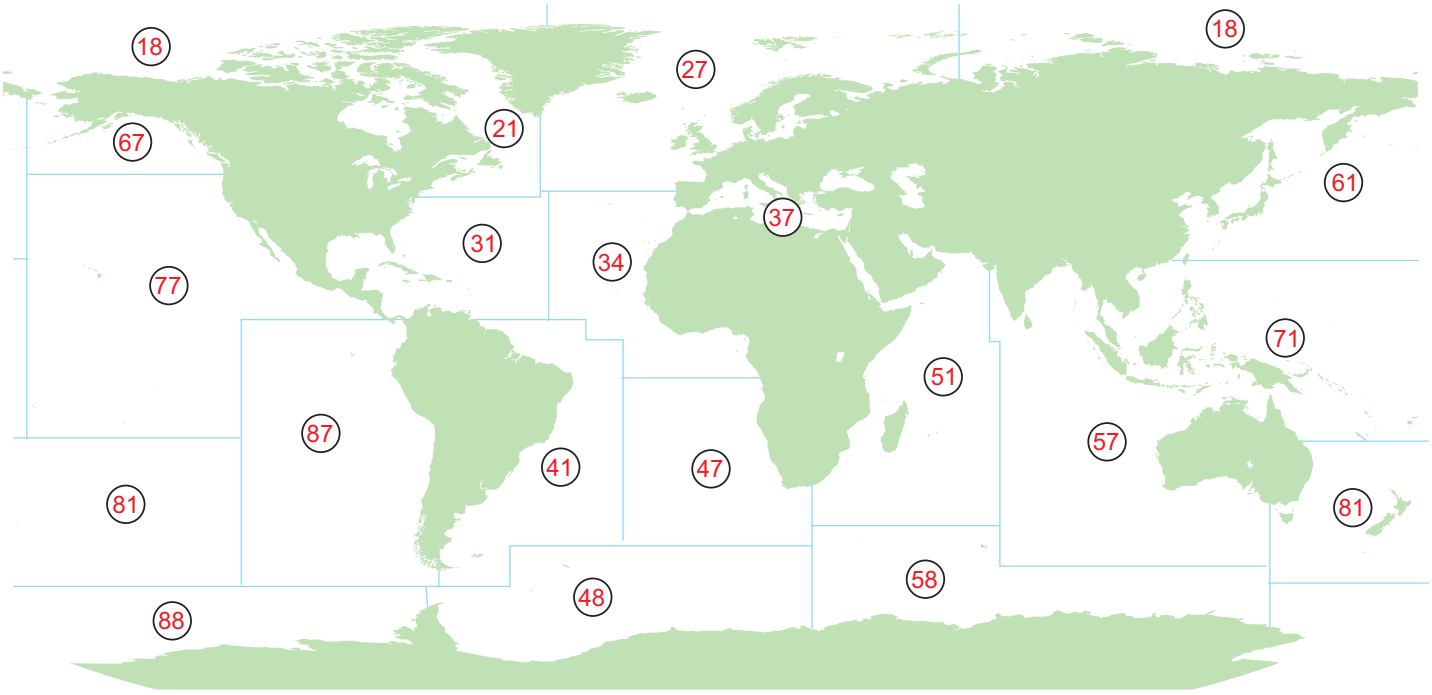


UN Food and Agriculture Organization (FAO) map of the world's major fishing areas.

STATUS OF GLOBAL STOCKS

The upward trend in global marine fish catch since 1950 has now ended, and indeed appears to have begun to decline, suggesting that the maximum long term potential of the world marine capture fisheries has been reached.[10]

Total landings of 83.7 million metric tons (MT) in 2005 were more than 1.7 million MT lower than in 2004, largely due to a decrease in catches of marine species other than anchoveta.[11] Total catches in 2005 fell by 4% from 2000 levels, with three regions — the northeast Atlantic, western central Atlantic, and the southwest Atlantic — experiencing significant declines of 13% to 20%.

Global Marine Landings by Region (million MT)

FAO #	Ocean Area	2000	2001	2002	2003	2004	2005	% change 2000-2005	% of Global Total (2005)
61	Northwest Pacific	23.2	22.6	21.3	22.0	21.4	21.6	-7%	25.9%
87	Southeast Pacific	15.8	12.7	13.7	10.5	15.4	14.6	-8%	17.4%
71	Western Central Pacific	9.7	10.1	10.5	10.8	10.9	10.8	11%	12.9%
27	Northeast Atlantic	11.0	11.1	11.1	10.3	10.0	9.6	-13%	11.5%
57	Eastern Indian Ocean	5.1	4.9	5.2	5.3	5.5	5.1	0%	6.1%
51	Western Indian Ocean	4.0	4.0	4.3	4.4	4.3	4.4	10%	5.2%
34	Eastern Central Atlantic	3.7	4.0	3.4	3.4	3.4	3.5	-6%	4.1%
67	Northeast Pacific	2.5	2.8	2.8	2.9	3.1	3.2	29%	3.8%
21	Northwest Atlantic	2.1	2.2	2.2	2.3	2.4	2.2	4%	2.6%
41	Southwest Atlantic	2.3	2.2	2.1	2.0	1.8	1.8	-20%	2.2%
47	Southeast Atlantic	1.6	1.6	1.7	1.7	1.7	1.6	0%	2.0%
77	Eastern Central Pacific	1.7	1.8	2.0	1.7	1.5	1.6	-9%	1.9%
31	Western Central Atlantic	1.8	1.7	1.8	1.8	1.7	1.5	-18%	1.8%
37	Mediterranean and Black Sea	1.5	1.6	1.6	1.5	1.5	1.4	-5%	1.7%
81	Southwest Pacific	0.7	0.7	0.8	0.7	0.7	0.7	0%	0.9%
48 58 88	Southern Oceans	0.1	0.1	0.1	0.1	0.1	0.1	7%	0.2%
	Total	**86.8**	**84.2**	**84.5**	**81.4**	**85.5**	**83.7**	**-4%**	**100.0%**

Source: FAO, world capture production in marine fishing areas-fish, crustaceans, molluscs, etc. ftp://ftp.fao.org/fi/stat/summary/default.htm#capture, Table A-1(a)

Of the 584 stocks or species groups reviewed by FAO (2004), information is only available to assess 76% of the stocks.

Potential expansion of fisheries is appropriate for at most the 17% of the world's fisheries that are considered underexploited or moderately exploited stocks

Of the stocks with a **known** status, 77% are at a level where there is no room for further expansion. These stocks fall into the following categories: 52% are fully exploited, at or close to the maximum sustainable production limit, 17% are over-exploited, 7% are depleted, and 1% are recovering. Only 3% of the known stocks are underexploited. An additional 20% are moderately exploited with some potential for further expansion.

Of the stocks tracked by the FAO, 24% have an **unknown or uncertain** status, meaning there is not enough information to adequately determine their capacity for expansion.

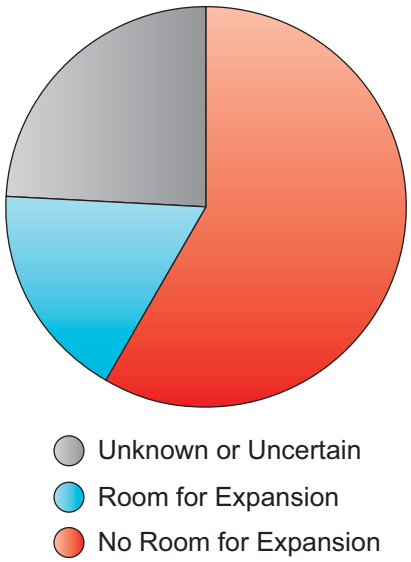
As a result, potential expansion of fisheries is appropriate for at most the 17% of the world's fisheries that are considered underexploited or moderately exploited stocks.

Global Status of Fish Stocks

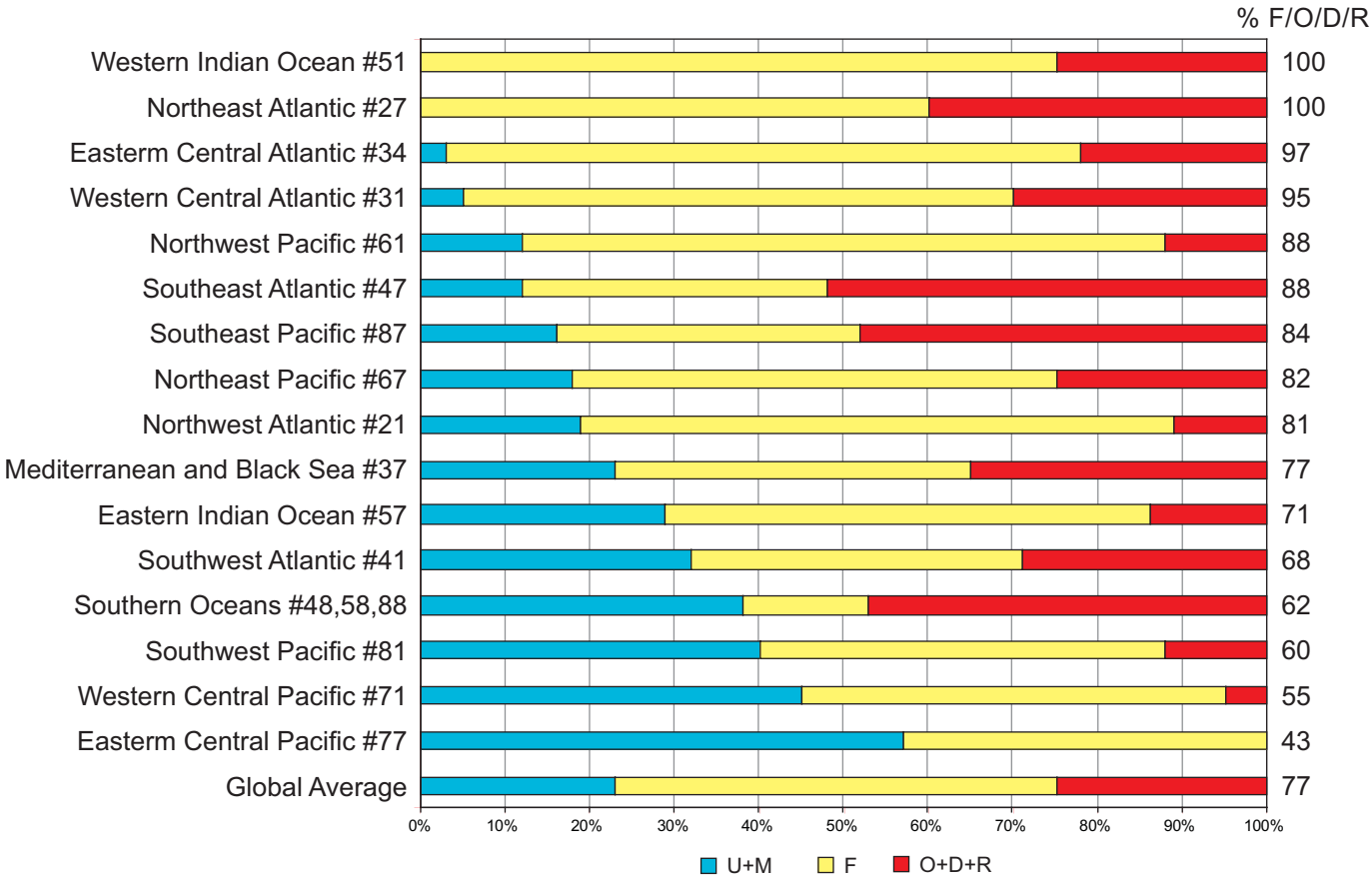
The percentage of stocks exploited at or beyond the levels corresponding to maximum sustainable yield (fully exploited, overexploited, depleted and recovering) ranges from 43% in the eastern central Pacific to 100% in the northeast Atlantic and western Indian Ocean. Overall, the high level of fully and overexploited stocks underscores the need to control fishing effort and capacity to effectively manage and rebuild stocks.

The major fishing areas with the highest proportion of overexploited, depleted and recovering stocks (ranging from 40% to 52%) are the southeast Atlantic, southeast Pacific, the southern oceans and the northeast Atlantic.[12]

A few areas report significant levels (40% to 57%) of under and moderately exploited stocks — the southwest Pacific, western central Pacific and the eastern central Pacific. However, considering the massive overcapacity in the world fishing fleet, it is clear that no additional capacity is needed to fish on these stocks.



Status of Known Stocks in 2004[13]



Stock Status	FAO Definitions for Stocks With Known Status[14]
U	Underexploited, undeveloped or new fishery. Believed to have a significant potential for expansion in total production.
M	Moderately exploited, exploited with a low level of fishing effort. Believed to have some limited potential for expansion in total production.
F	Fully exploited. The fishery is operating at or close to an optimal yield level, with no expected room for further expansion.
O	Overexploited. The fishery is being exploited at above a level which is believed to be sustainable in the long term, with no potential room for further expansion and a higher risk of stock depletion/collapse.
D	Depleted. Catches are well below historical levels, irrespective of the amount of fishing effort exerted.
R	Recovering. Catches are again increasing after having been depleted or a collapse from a previous high.

Ten species account for fully 30% of the world total marine capture fisheries production. Of those ten, eight are fully exploited or overexploited, meaning that no increase whatsoever in catch can be expected. These stocks include the Peruvian anchoveta in the southeast Pacific, Alaska Pollock in the north Pacific, Japanese anchovy in the northwest Pacific, blue whiting in the northeast Atlantic, capelin and Atlantic herring in the north Atlantic, and yellowfin tuna, which is fully exploited in all ocean areas (east and west Atlantic, the Indian Ocean, and the east and west Pacific). In addition, the largehead hairtail currently has an unknown status. Furthermore, the skipjack tuna, whose status is unknown in many basins, is considered overexploited in the western central Atlantic and fully exploited in the western central Pacific. Thus, nine of the top ten marine capture species cannot withstand any further expansion in their fisheries.

Nine of the top ten marine capture species cannot withstand any further expansion in their fisheries

Catch compositions are shifting in response to the decline in dominant species. These shifts in species composition indicate that the present level of exploitation is unsustainable and could lead to unpredictable consequences for the oceans.[15]

- The introduction of industrialized fishing has removed 90% of the populations of large predatory fish, such as sharks, tuna, and marlin, from the oceans.[16]
- Some species, such as the bull, dusky, and smooth hammerhead sharks in the North Atlantic, have declined as much as 99% in the past 30 years.[17]
- The loss of other predators, such as groundfish species, has also altered the composition of the remaining catches. For example, the decline of Argentine hake in the southwest Atlantic has been accompanied by the increase in the catch of shortfin squid.[18]
- Declines in bottom dwelling fishes in the northwest Atlantic have resulted in increases in catches of mollusks and crustaceans.[19]

The increased global fishing capacity in the past few decades has not only resulted in the full or overexploitation of virtually all major fish stocks, it has also resulted in a decrease in efficiency in many fisheries. For example, the total fishing power of Chinese vessels in the East China Sea increased by a factor of about 7.6 between the 1960s and 1990s, while catch per unit of effort declined over the same period by a factor of three.[20]

The large number of stocks for which the FAO has no status information — about 24% of total stocks, representing 20% of the world's catch in 2005 — is also a significant concern.[21]

There is historical evidence of overexploitation and stock declines for some species whose assessment status was unknown at the time of greatest exploitation

The FAO Code of Conduct for Responsible Fisheries cautions that "states should apply the precautionary approach widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment"[22] and that they "should adopt as soon as possible cautious conservation and management measures in the case of new or exploratory fisheries."[23] If the FAO guidelines for responsible fishing and management are applied, fishing pressure should not be increased on stocks of unknown status unless and until "there is sufficient data to allow assessment of the impact of the fisheries on the long-term sustainability of the stocks."[24]

Insufficient information exists to assess the level of exploitation of more than half the stocks fished in the western Indian Ocean, the eastern central Pacific, the southern oceans, the western central Atlantic, and the southwest Atlantic. For the western Indian Ocean and the western central Atlantic, which have a high level of exploitation for stocks with a known status, this level of uncertainty constitutes a significant challenge to the region's countries ability to sustainably manage the fish stocks and ocean resources.

There is historical evidence of overexploitation and stock declines for some species whose assessment status was unknown at the time of greatest exploitation.

For example, fisheries for oceanic deep-water species and highly migratory species (or straddling stocks) have experienced rapid development before adequate knowledge was obtained about the overall status of the stocks fished. Many of these species, especially sharks and deep-water species, are vulnerable to overexploitation because of their life history characteristics.

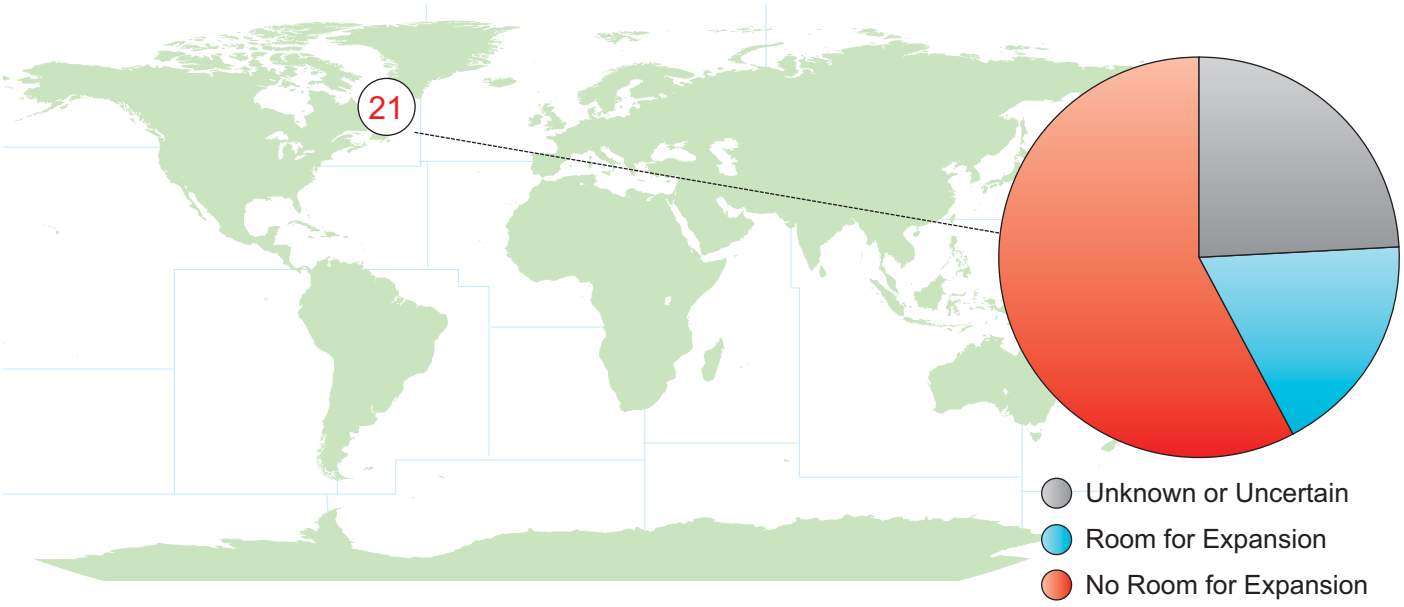
Also complicating our ability to determine fishery status is the fact that many high seas fishing vessels have no flag-responsibility to report their catches, fishing effort or area of operations. As a result, significant fisheries may go unreported if the landings occur in foreign countries.[25]

RESOURCE STATUS BY REGION[26]

The following section of the report reviews the status of fisheries resources based on information contained in FAO reports, primarily *Fisheries Technical Paper 457 (Review of the state of world marine fishery resources)*[27] *and World capture production in marine fishing areas.*[28]

Northwest Atlantic (FAO statistical area 21)

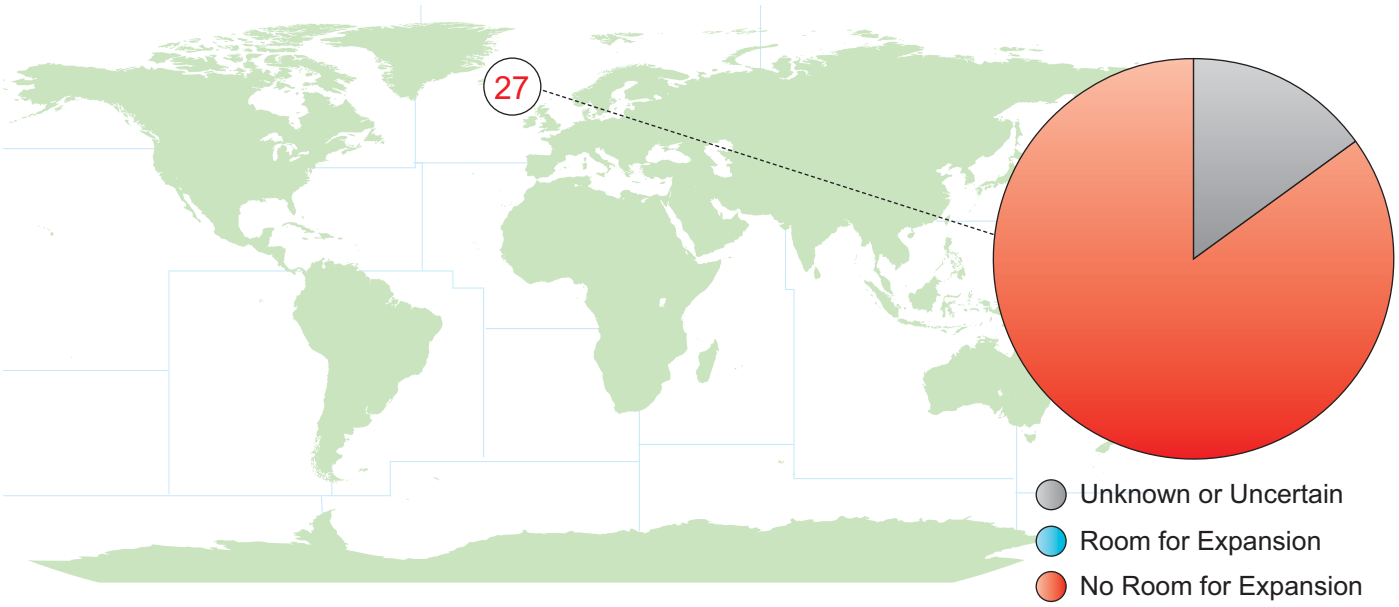
The Northwest Atlantic accounted for 2.6% of global landings in 2005. In the Northwest Atlantic, 61% of fish stocks have no room for further expansion, 17% have some room for further expansion, and the status of 22% is unknown.



- Catches in 2005 fell 8% from 2004 levels, reversing increases seen since 2001.
- Expansion of Canadian fishing capacity following the extension of national jurisdiction in 1977 drove increased effort in the groundfish fisheries.[29] This fishing pressure, combined with a succession of weak year-classes, led to closure of most of the demersal fisheries (e.g. cod) in 1992.[30] Since then, many stocks continue to be very low and the FAO concludes that "there will not be a prompt recovery in any of these stocks in the near future."[31]
- In the United States, fishing mortality on most groundfish stocks has been reduced substantially since the mid 1990s, "largely through the adoption of stronger management actions, and stock rebuilding has begun."[32] The sea scallop fishery has begun to recover from unsustainable fishing in the late 1980s and 1990s, following a change in management.[33]

Northeast Atlantic (FAO statistical area 27)

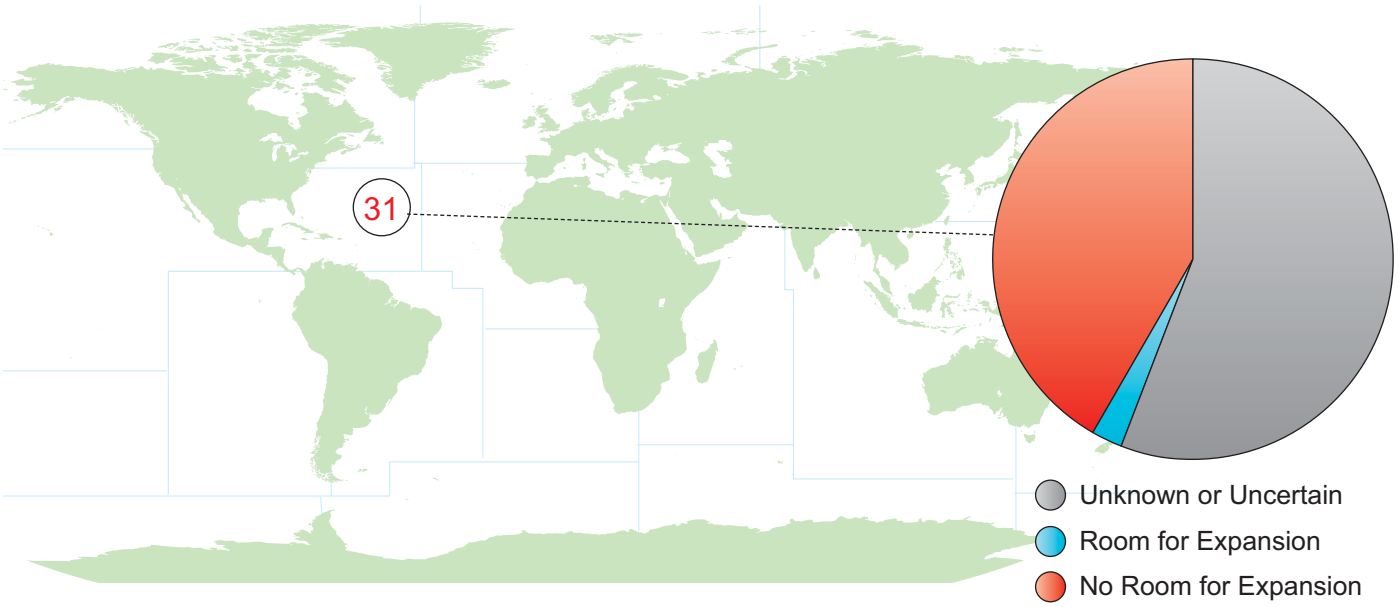
The Northeast Atlantic accounted for 11.5% of global landings in 2005. In the Northeast Atlantic, 89% of fish stocks have no room for further expansion and the status of 11% is unknown. No stocks have room for expansion.



- Catches increased from 5.2 million MT in 1950 and peaked at nearly 13 million MT in 1976. Total catches fell 4% in 2005, continuing the downward trend evident since 2001. Catches in 2004 and 2005 totaled less than 10 million MT for the first time since 1991.
- "Most of the traditional fishery resources of the Northeast Atlantic are fully exploited, overexploited or depleted. Although new fisheries have developed for deep sea species, there are reasons to believe that these resources will not be harvested sustainably as they are notoriously sensitive to exploitation. Some deep-sea species have become depleted before appropriate management could be implemented."[34]
- Overexploitation of northeast Atlantic fishery stocks has occurred despite substantial investments in fishery management, including science, monitoring, control and surveillance. "Possible reasons include improper implementation of fishery management, ineffectual enforcement, insufficiently reliable scientific assessments, setting of allowable catch above scientifically advised levels, and actual fish catch exceeding allowable levels."[35]

Western Central Atlantic (FAO statistical area 31)

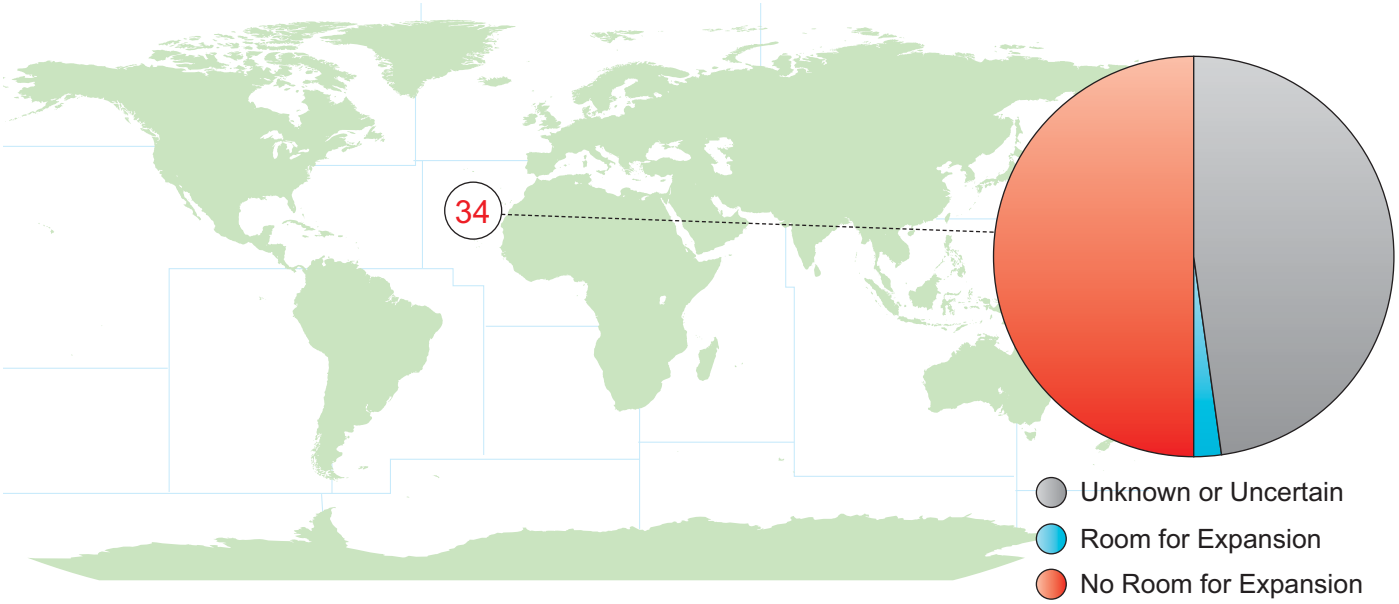
The Western Central Atlantic accounted for 1.8% of global landings in 2005. In the Western Central Atlantic, 41% of fish stocks have no room for further expansion, 2% have some room for further expansion, and the status of 56% is unknown.



- Catches fell dramatically in 2005, down 10% from 2004 and 18% since 2000.
- The most marked feature of this region is the very high uncertainty about the status of even the more important fisheries resources. “Unless urgent steps are taken to collect sufficient information on landings and effort to provide, at least, the minimum information necessary to ensure sustainable utilization, there is a high risk that landings will continue to decline. This will lead to further erosion of the social and economic benefits currently being derived from the region’s marine resources.”[36]

Eastern Central Atlantic (FAO statistical area 34)

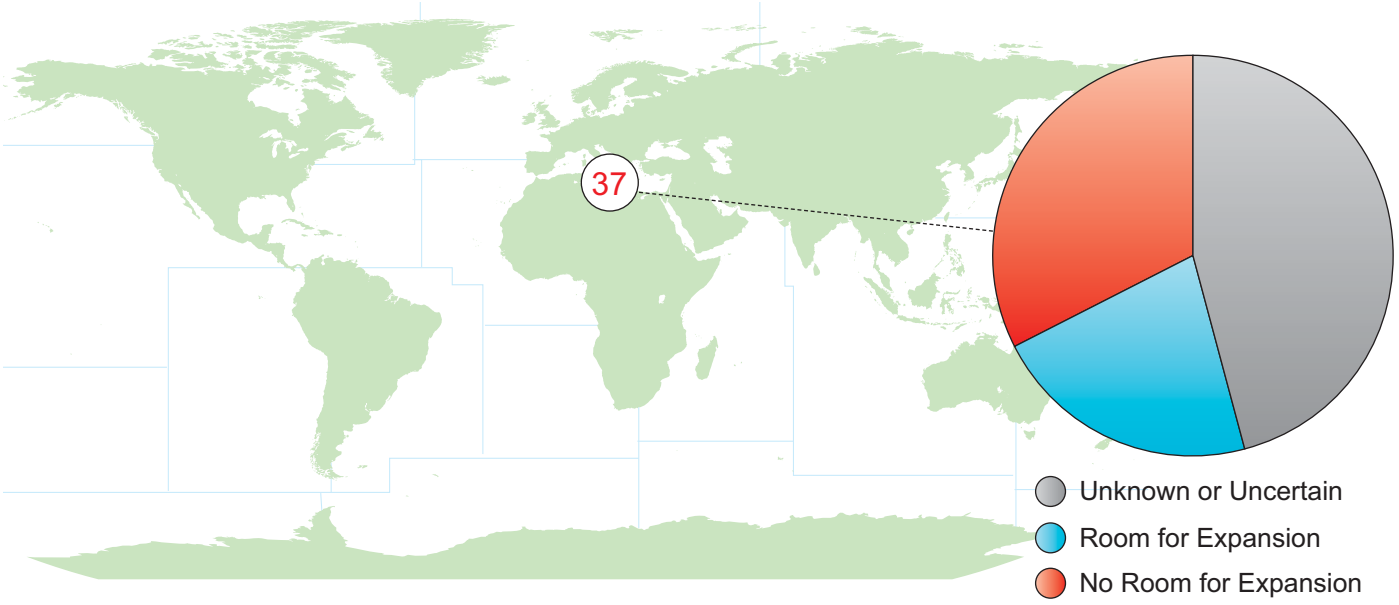
The Eastern Central Atlantic accounted for 4.1% of global landings in 2005. In the Eastern Central Atlantic, 57% of fish stocks have no room for further expansion, 2% have some room for further expansion, and the status of 41% is unknown.



- Most of the bottom dwelling resources off northwest Africa are considered fully to overexploited. One species, the grouper *Epinephelus aeneus,* found mainly in Mauritania, Senegal and the Gambia, was assessed to be so overexploited that it was close to extinction.[37] Other stocks considered to be overexploited include[38]:
  - The northern and central stocks of common octopus
  - Deep-sea and shallow water shrimp in the northern areas covered by the Committee for the Eastern Central Atlantic Fisheries (CECAF)
  - In Mauritania, the northern and southern stocks of green lobster and deep-sea crab
  - Spiny lobsters in the Cape Verde area
  - Cuttlefish and southern pink shrimp stocks in Guinea
  - Shrimps in the Gulf of Guinea from Ivory Coast to Cameroon
- The FAO recommends that as a precautionary measure, the present fishing effort should be maintained or reduced for all demersal and pelagic species in the region and also shrimps.[39]

Mediterranean and Black Sea (FAO statistical area 37)

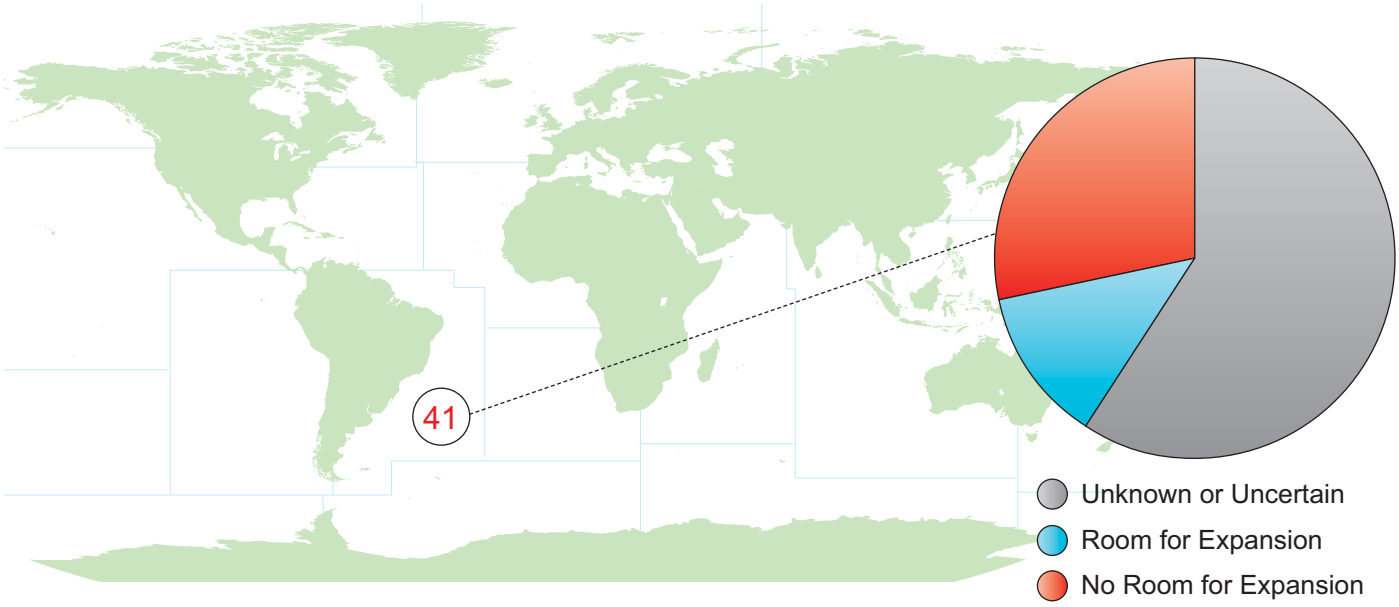
The Mediterranean and Black Sea accounted for 1.7% of global landings in 2005. In the Mediterranean and Black Sea, 48% of fish stocks have no room for further expansion, 17% have some room for further expansion, and the status of 35% is unknown.



- Although this appears to be the most stable area in terms of total catches, a more detailed analysis by species group shows a decrease some of the most valuable fishery resources, including demersal fishes, tunas and sharks.[40]
- "Overall there are few management measures restricting effort or overall catch in most countries. A substantial effort is urgently needed to increase the current investment in stock assessment and fishery research and improve scientific advice provided to fishery managers and industry."[41]

Southwest Atlantic (FAO statistical area 41)

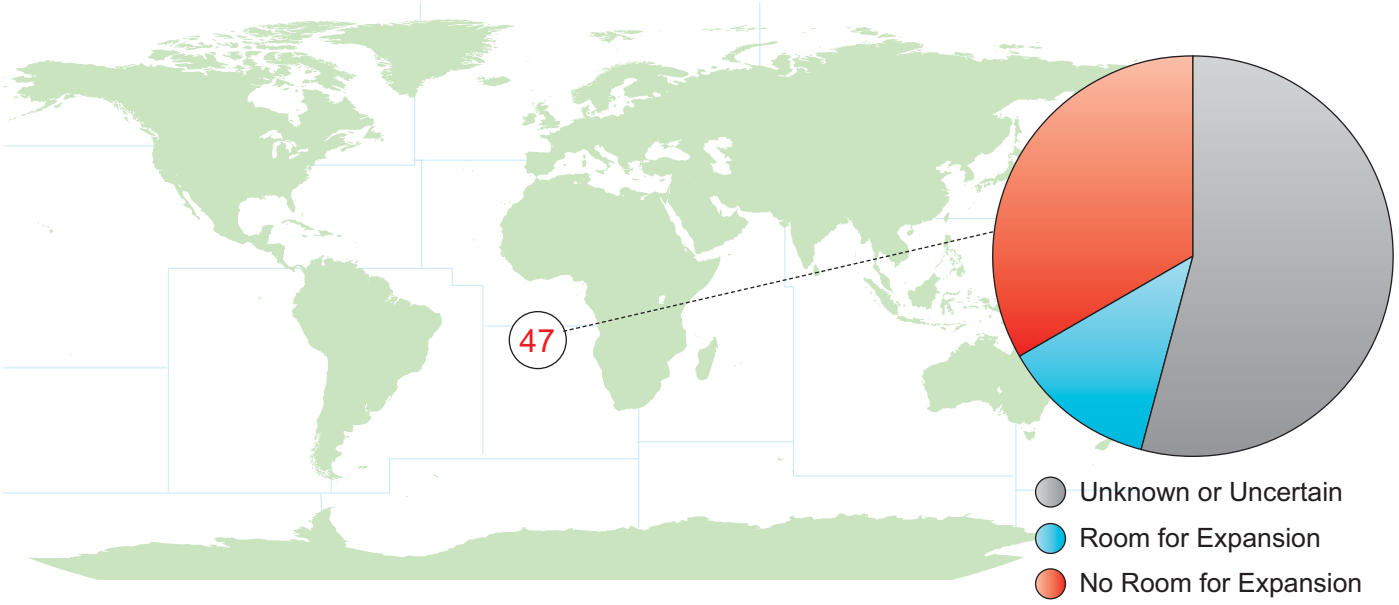
In the Southwest Atlantic, which accounted for 2.2% of global landings in 2005, 32% of fish stocks have no room for further expansion, 12% have some room for further expansion, and the status of 56% is unknown.



- Total catches in 2005 decreased 20% from 2000.
- "Until the late 1970s and early 1980s, this area was among the few major fishing areas of the world with a significant potential for expansion and where abundant and potentially valuable fish resources were still reported as underexploited or lightly exploited. Several coastal and mostly industrialized long-range fisheries have developed since and most of the fish stocks are now considered to be fully exploited, while some are, or have been, overexploited, even severely, in recent years. Although most fisheries are under some kind of management scheme, enforcement is not always effective."[42]

Southeast Atlantic (FAO statistical area 47)

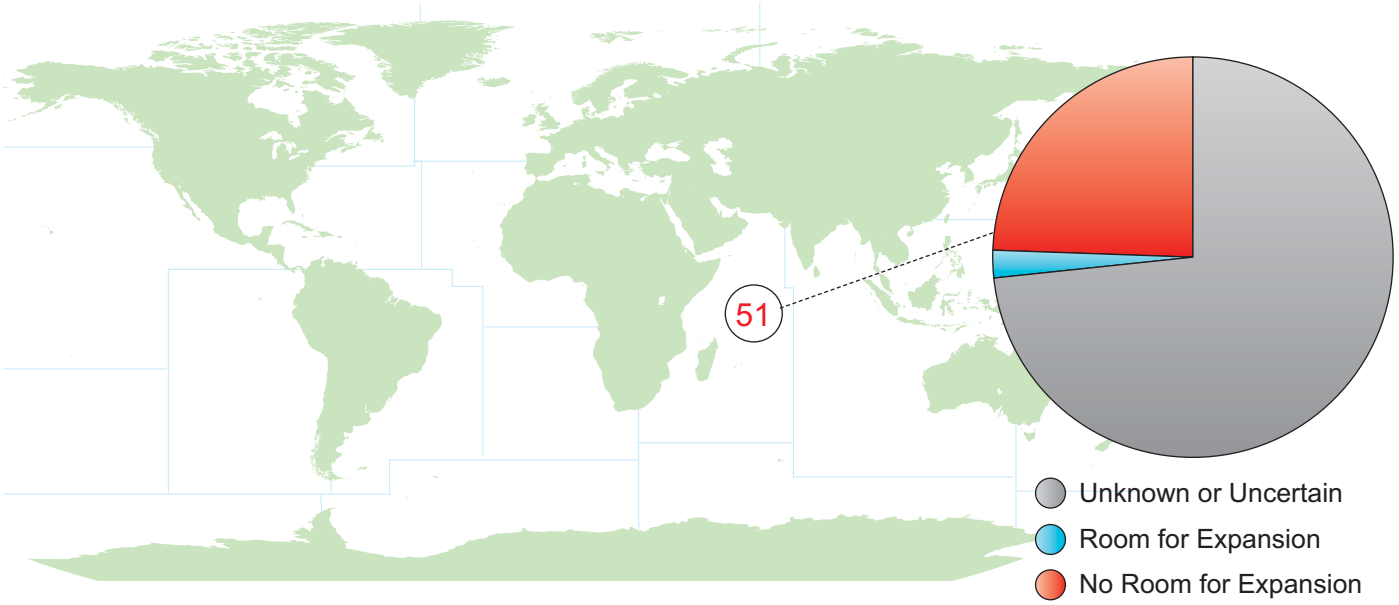
The Southeast Atlantic accounted for 2.0% of global landings in 2005. In the Southeast Atlantic, 52% of fish stocks have no room for further expansion, 9% have some room for further expansion, and the status of 39% is unknown.



- "Most of the commercially important stocks within the region are classified as being between fully exploited and overexploited. More conservative management measures have generally been put in place and at present the most important resources are managed either for sustainable yields or with a goal of encouraging recovery. Both Namibia and South Africa have well-developed management systems in place for their most important stocks, and Angola is also making progress in monitoring and implementing effective management for some of the important resources."[43]
- "Substantial problems still exist in many fisheries, with varying underlying causes including environmental variability, scientific uncertainty and conflicting biological and socio-economic objectives. Difficulties in monitoring, control and surveillance occur throughout the region and are particularly significant in some coastal fisheries where access and catches are difficult to control."[44]
- For example, in South Africa, severe problems with illegal fishing are being experienced in the abalone fishery. "In 2002, more abalone were confiscated by the law enforcement agency than were landed by the legal fishery."[45]

Western Indian Ocean (FAO statistical area 51)

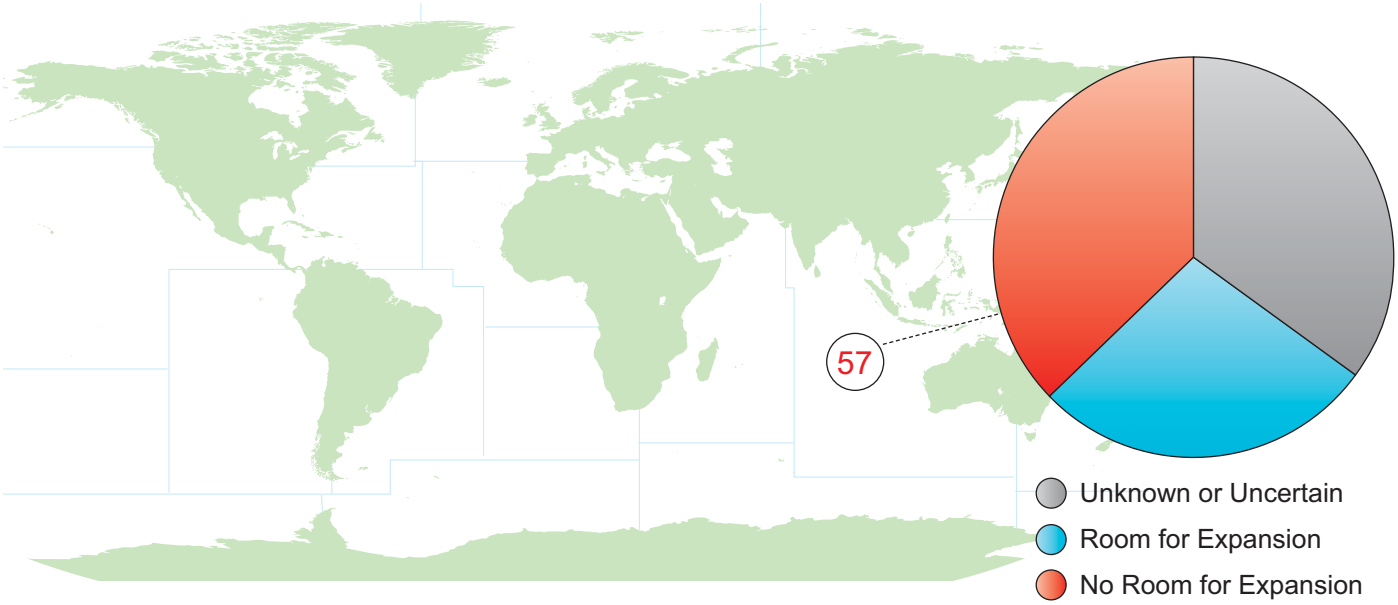
The Western Indian Ocean accounted for 5.2% of global landings in 2005. In the Western Indian Ocean 24% of fish stocks have no room for further expansion, 2% have some room for further expansion, and the status of 73% is unknown.



- "Most of the coastal fish stocks of the region are considered to be fully exploited. While the coastal fisheries are harvested mostly by coastal states, the more lucrative oceanic fisheries are harvested mostly by distant-water fleets from Europe and eastern Asia."[46]
- The industrial shrimp fishery in Mozambique is scientifically monitored and actively managed. However, recent analyses suggest that the resource is fully exploited and that fishing effort should be reduced.[47]
- "In the eastern Arabian Sea, the enormous number of small fishing vessels in the western Indian Ocean complicates monitoring of stock status and makes implementation of fisheries management measures difficult. In many cases no restrictions exist on entry into the fishery for social reasons. ...Given the scarcity of alternative employment, fishing intensity remains high, increasing whenever the catch rates and economic conditions allow it to do so. ...Gear restrictions are few and there is little active regulation of fisheries. Most commercial species are heavily exploited. Consequentially, concerns must exist regarding overfishing and ecosystem modification caused by trap and gillnet fishing in coral reef areas..."[48]
- "In the Persian Gulf and Gulf of Oman rising incomes and the traditional popularity of fish have resulted in full exploitation of virtually all fisheries resources of the area. Major concerns exist regarding the status of Spanish mackerel, a premium fish in great market demand, shrimp and grouper."[49]

Eastern Indian Ocean (FAO statistical area 57)

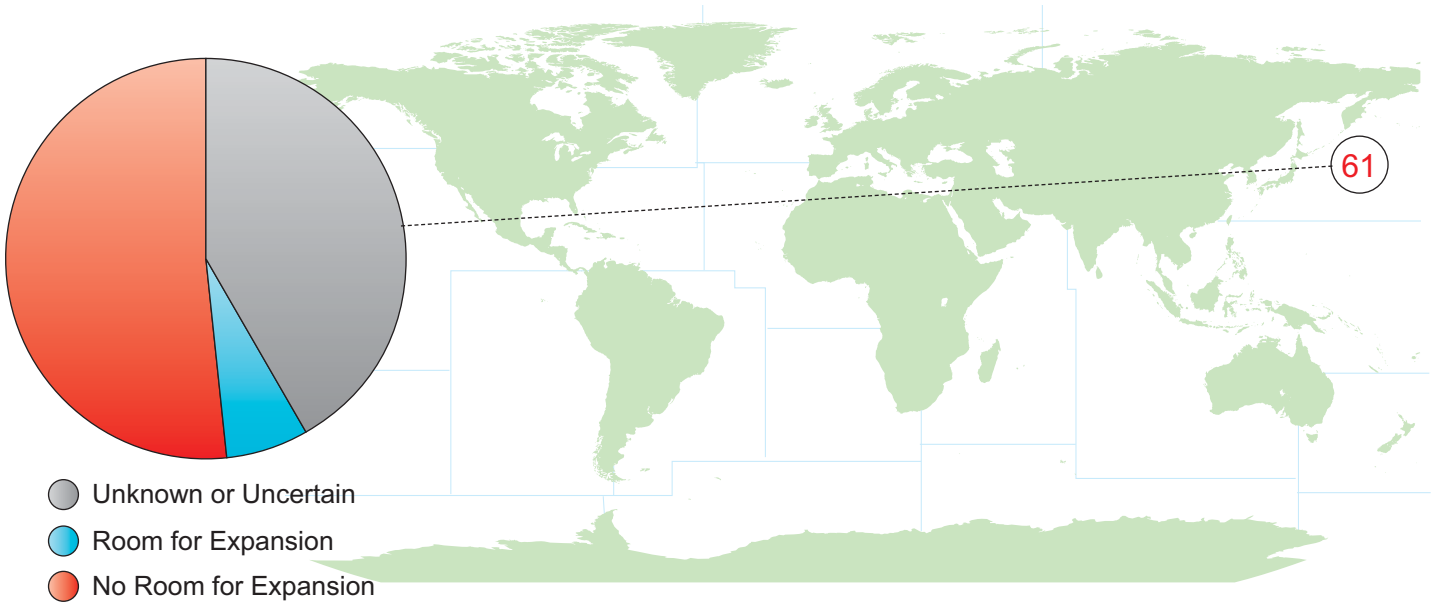
The Eastern Indian Ocean accounted for 6.1% of global landings in 2005. In the Eastern Indian Ocean, 37% of fish stocks have no room for further expansion, 28% have some room for further expansion, and the status of 35% is unknown.



- "The general status of the coastal fisheries, defined here as inside the 12 nm zone for ease of reference, was that they were all overfished and have been under considerable fishing pressures from uncontrolled, open access fisheries management schemes for several years in all countries in the region."[50]
- "Overexploitation of the resources in coastal waters of the northern areas of the Eastern Indian Ocean is very much related to the population pressure in the coastal area, lack of employment opportunities and ineffectiveness of management measures."[51] "Poaching is still a problem in this area due to the weakness of monitoring, control and surveillance (MCS) in many coastal states."[52]

Northwest Pacific (FAO statistical area 61)

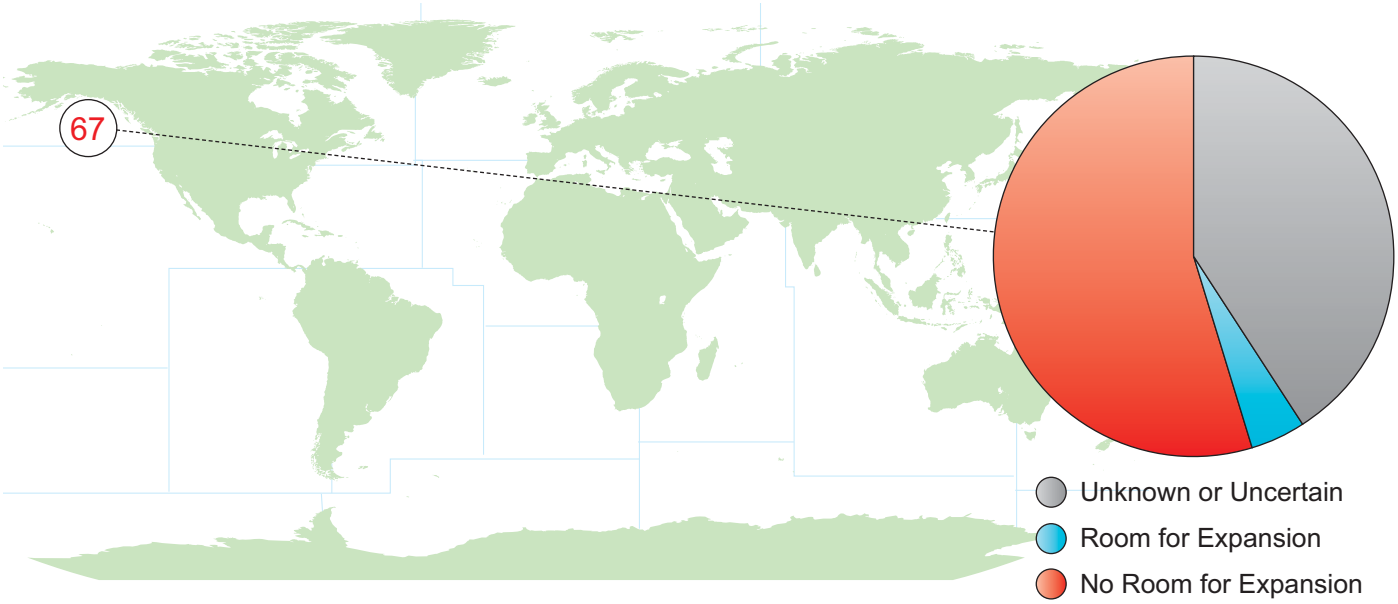
The Northwest Pacific Ocean accounted for 25.9% of global landings in 2005. In the Northwest Pacific, 52% of fish stocks have no room for further expansion, 6% have some room for further expansion, and the status of 42% is unknown.



- After peaking near 25 million MT in 1998, total catch appears to have stabilized around 21-22 million MT.[53] The abrupt decrease in the sardine population in the early 1990s is believed to be governed by ecosystems changes but the significant decreases in catch for Alaska pollock can be attributed to overexploitation.[54] "All the major pollock stocks are believed to be at substantially lower biomass than existed in the 1980s."[55]
- "In the East China Sea, the total fishing power of Chinese vessels increased by a factor of about 7.6 between the 1960s and 1990s, catch per unit of effort declined over the same period by a factor of 3. In coastal seas such as the East China and Yellow Seas, there has been a shift in catches from large high-valued fish to lower-valued smaller fishes, from demersal and pelagic predator fishes to pelagic plankton-feeding fishes, from larger to smaller individuals. Reduction of fishing effort in some areas is considered urgent."[56]

Northeast Pacific (FAO statistical area 67)

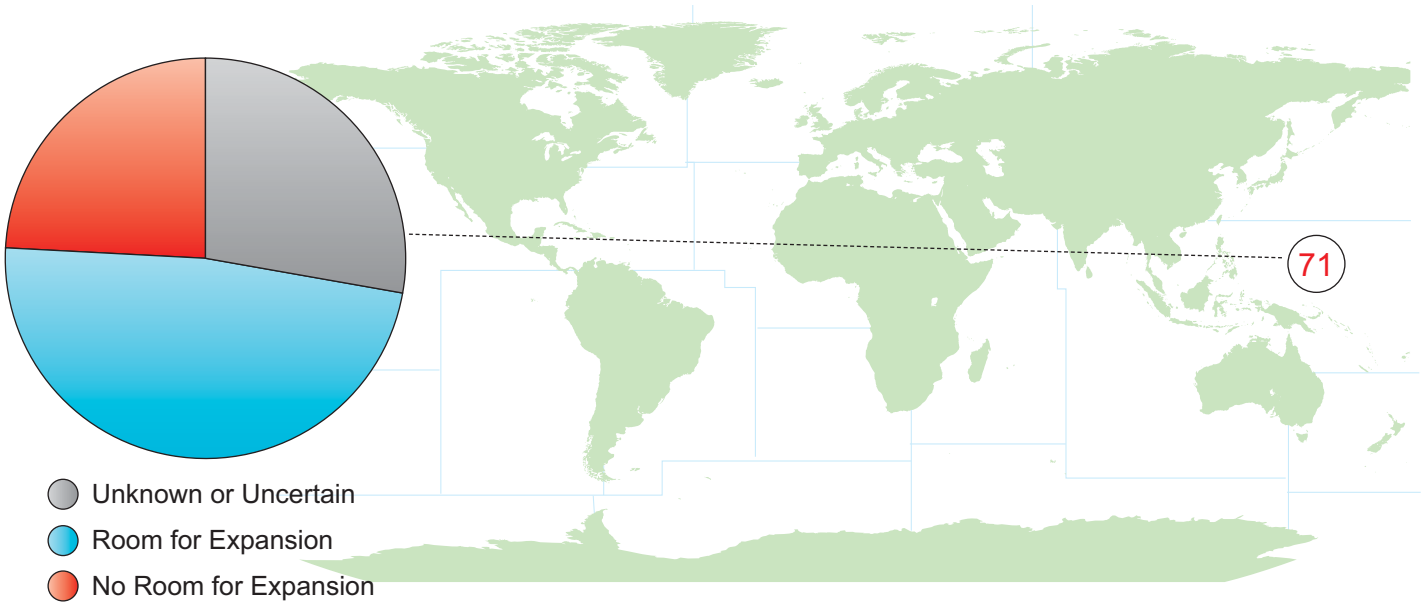
The Northeast Pacific Ocean accounted for 3.8% of global landings in 2005. In the Northeast Pacific, 57% of fish stocks have no room for further expansion, 4% have some room for further expansion, and the status of 39% is unknown.



- Catches increased by 5% in 2005 and are up 29% from 2000. Nonetheless, 82% stocks are considered fully exploited or overexploited, while only 18% are under or moderately exploited. For example:
  - "Alaskan pollock and Pacific whiting are fully utilized, while Pacific cod are fully utilized in both the Bering Sea and the Gulf of Alaska."[57]
  - The abundance of Pacific hake is continuing to decline, as is black halibut.[58]
  - "Commercial groundfish stocks off the west coast of Canada are at low to average abundance and nine groundfish species have been declared overfished by the U.S. National Marine Fisheries Service."[59]

Western Central Pacific (FAO statistical area 71)

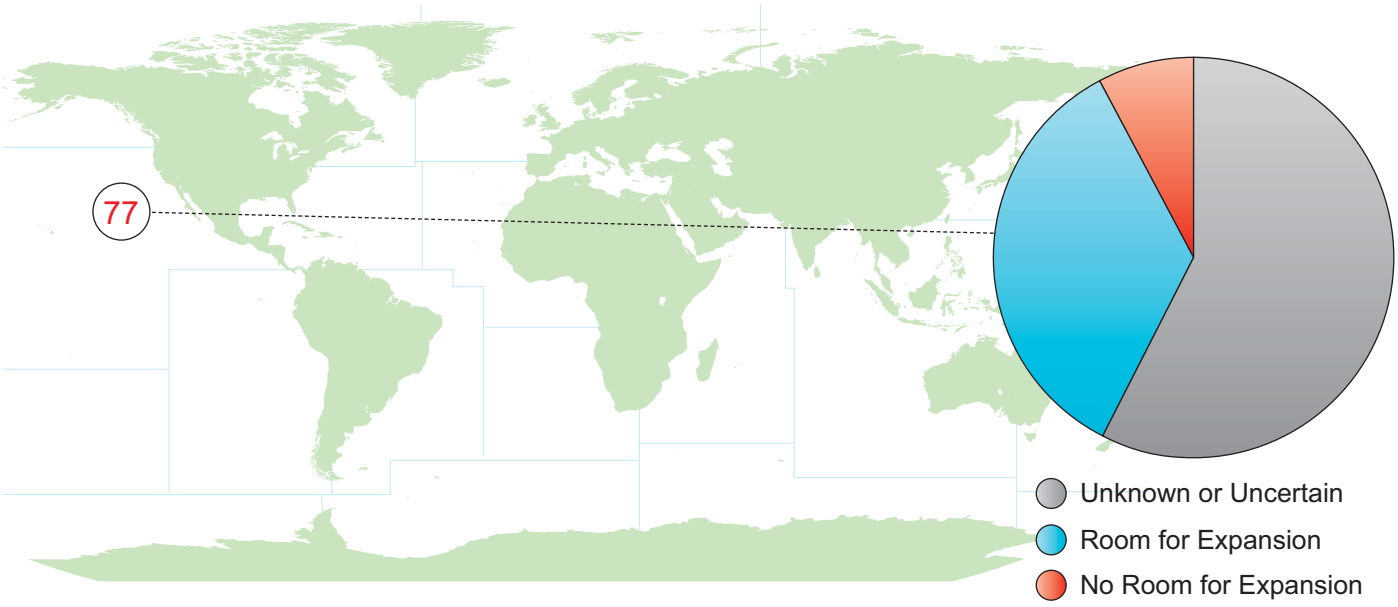
The Western Central Pacific Ocean accounted for 12.9% of global landings in 2005. In the Western Central Pacific, 24% of fish stocks have no room for further expansion, 48% have some room for further expansion, and the status of 28% is unknown.



- Total catches of the region have increased steadily since 1950 to reach nearly 11 million MT in 2004, falling slightly in 2005.[60] "The majority of the catch is consumed locally by the large population in bordering countries, with shrimp and tuna being the main export commodities."[61] Distant water fleets of Japan, Korea, Taiwan and the United States fish for tuna in the region under fishing arrangements with the Pacific island states.[62]
- "Despite the rapid and continued development of fisheries in this region, knowledge of the status of resources is insufficient. More than 25% of catch in the region is of unidentified species. Some of the coastal resources, especially shrimp in the Gulf of Thailand and some parts of the national waters of Indonesia and the Philippines, are heavily exploited. Increased fishing pressure has been associated with the increasing number of fishermen and the increased use of efficient gears."[63]
- "Development of trawl fishing in the Gulf of Thailand has resulted in overexploitation of demersal species."[64]
- "The recent development of trawl fishing using small vessels of 20-30 GT based in the Aru Island contributed to the decline of the shrimp stock in the western part of the Arufura Sea."[65]
- "Of the various shrimp fisheries in the northern territory of Australia, tiger prawn is biologically overfished as is the brown and grooved tiger prawn."[66]

Eastern Central Pacific (FAO statistical area 77)

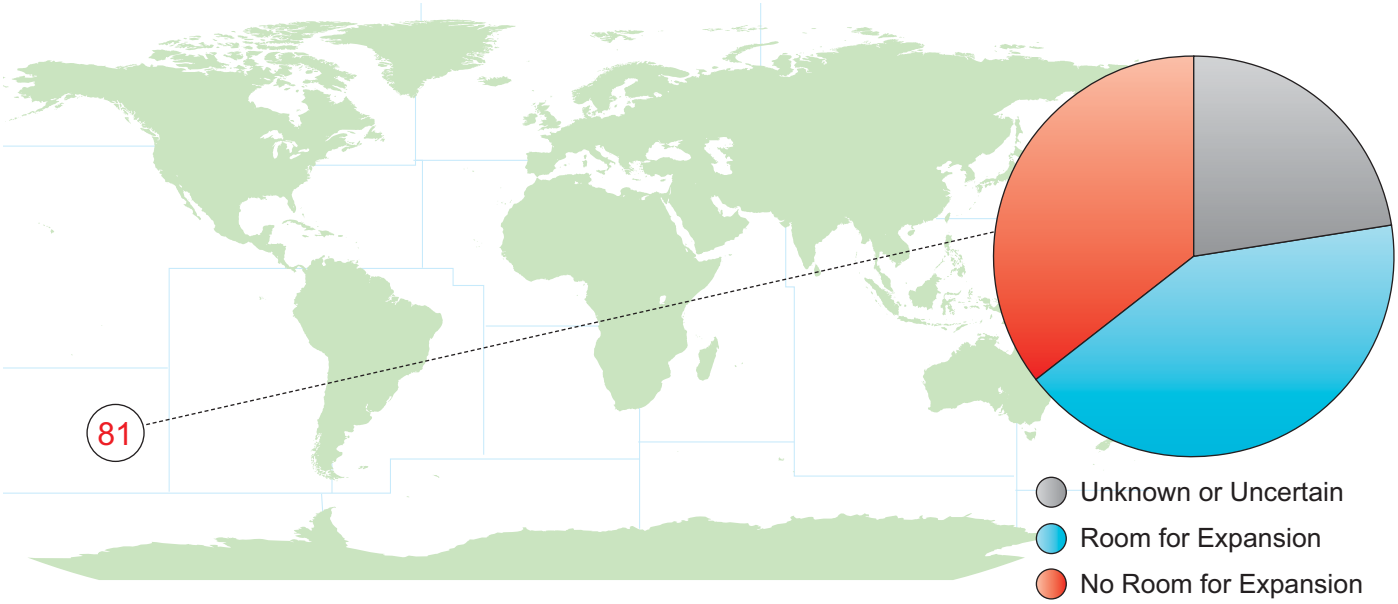
The Eastern Central Pacific Ocean accounted for 1.9% of global landings in 2005. In the Eastern Central Pacific, 8% of fish stocks have no room for further expansion, 35% have some room for further expansion, and the status of 58% is unknown.



- Since 1981 total catches have fluctuated between 1.2 and 2 million MT, largely reflecting the large fluctuations in marine populations caused by the El Nino-Southern Oscillation phenomenon.[67] The majority of stocks in this region are under to moderately exploited.
- Tunas and other large pelagics such as swordfish "have an extended distribution and yield high catches in the area."[68] Most tunas and other highly migratory species are exploited both by local fleets and by distant water fleets.[69] "Tunas, bonitos, billfishes, etc. are considered to be moderately to fully exploited in this region."[70]
- "Most fisheries are subject to some form of management regulation, which has contributed to the healthy maintenance and in some cases the rebuilding of key stocks in the area. However, in some cases poor management and loose enforcement has contributed to the depletion of some important stocks, particularly some local shrimp stocks."[71]
- Most coastal demersals are moderately exploited by their directed fisheries but tend to be heavily to overexploited as bycatch in shrimp fisheries.[72]
- "There are clear indications that the California pilchard (sardine) population has recovered from its depletions in the 1950s and 1960s and is considered now to be moderately to fully exploited."[73]
- "California anchovy is seriously depleted partly due to heavy fishing but also as a result of adverse environmental conditions."[74] It is fully to heavily exploited off Mexico and moderately to almost unexploited off the USA.[75]
- The Pacific anchoveta stock "sustains a major industrial fishery" in Panama, and "is probably fully exploited. The Pacific thread herring is probably fully exploited off Panama, but underexploited elsewhere in its range."[76]

Southwest Pacific (FAO statistical area 81)

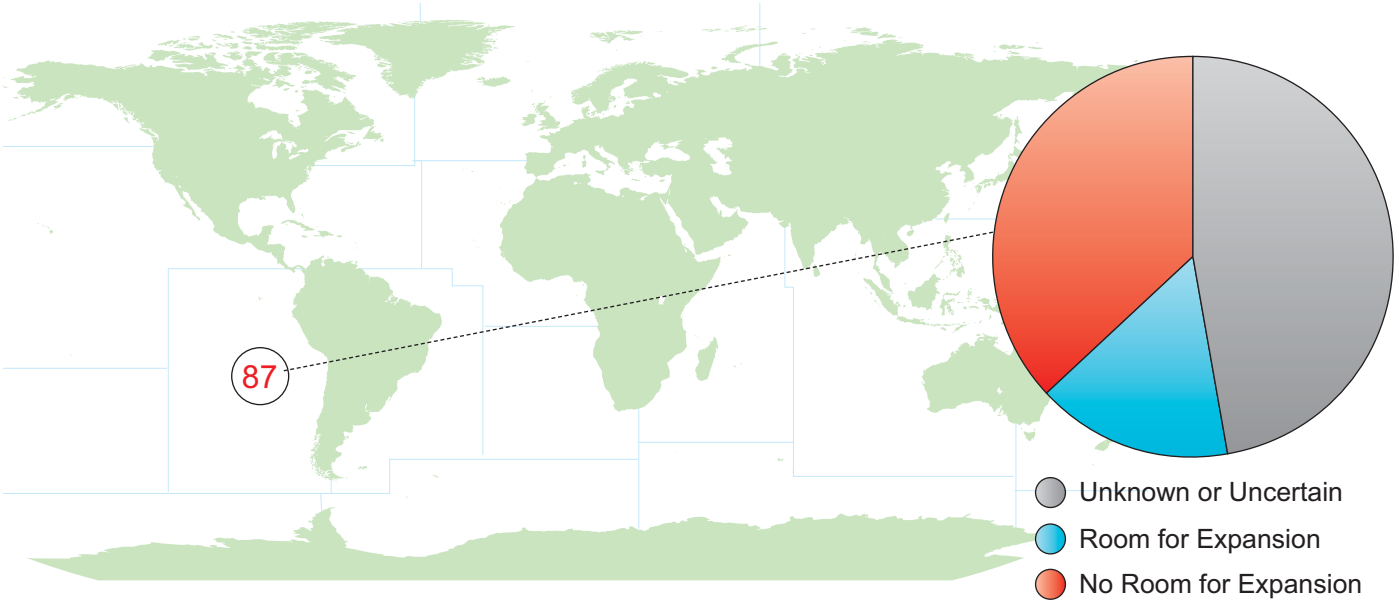
The Southwest Pacific Ocean accounted for 0.9% of global landings in 2005. In the Southwest Pacific, 35% of fish stocks have no room for further expansion, 42% have some room for further expansion, and the status of 23% is unknown.



- "Management by quota of the major species in New Zealand fisheries has enhanced the fish stocks and economics of New Zealand fisheries over the last twelve years, a period when the resources and economics of similar fisheries have been depleted in other countries. The seafood industry is paying the full costs for fisheries management, enforcement and research, an annual investment of 3 percent of gross returns."[77]

Southeast Pacific (FAO statistical area 87)

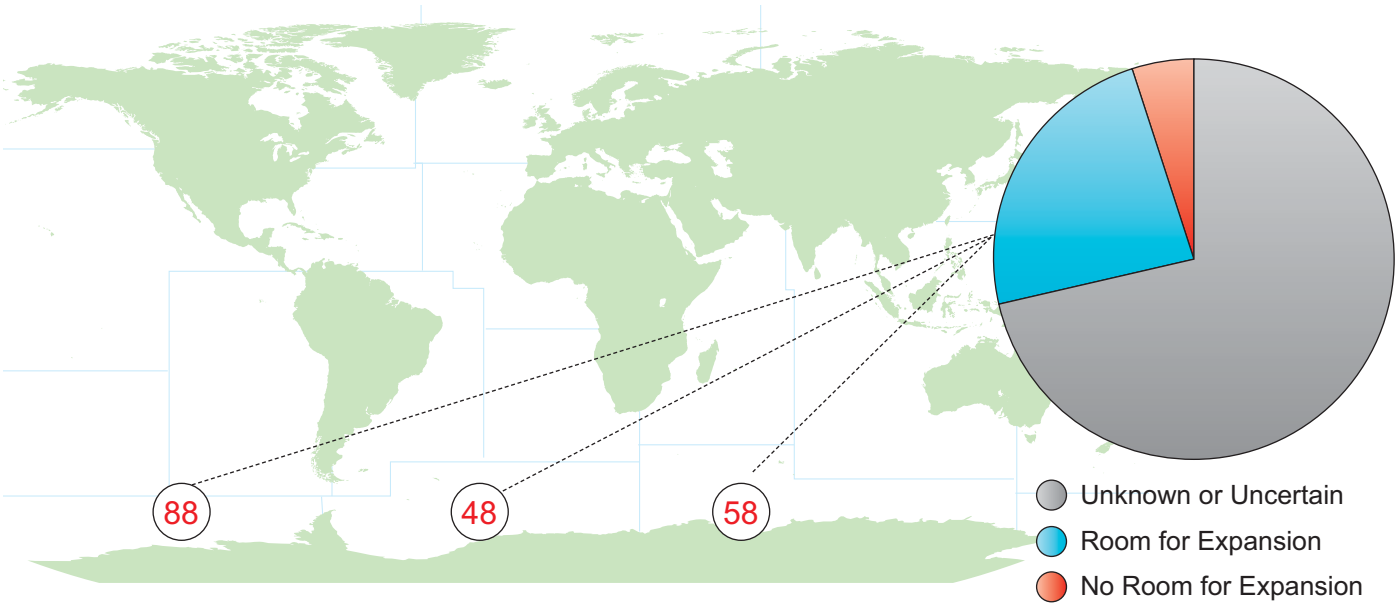
The Southeast Pacific Ocean accounted for 17.4% of global landings in 2005. In the Southeast Pacific, 45% of fish stocks have no room for further expansion, 14% have some room for further expansion, and the status of 41% is unknown.



- After the Northwest Pacific, this region is the highest contributor to world fish production. As a result, the large fluctuations in the abundance and species composition of its main fish resources have a noticeable effect on global fisheries trends and projections.[78] "Most of the main fisheries in the area are under a national fisheries management scheme although their efficacy varies greatly."[79]
- "The anchoveta fishery developed in the 1960s and early 1970s on the basis of an overoptimistic perception of the real sustainable abundance of the stocks. Inadequate management and El Nino events combined with heavy fishing and excessive expansion of fishing capacity to periodically deplete stocks."[80] The stocks of Peruvian anchoveta have recovered but there are still concerns over potential overfishing, particularly since fishing capacity is estimated to be 40% higher than advisable.[81]
- "The South American sardine was overexploited and has virtually disappeared from some areas. A relaxed management regime allowed fishing pressure to build up rapidly and remain high, even while biomass and recruitments were falling."[82]
- "The Chilean jack mackerel is considered to be fully or overexploited, particularly given the expansion of fishing pressure in some areas. A drastic decline in catches led Chile to establish tight management measures based on non-transferable individual quotas, but there continue to be concerns about the state of the stock and the sustainability of the fishery."[83]
- "The Chilean stock of South Pacific hake is considered to be fully exploited, although there is some concern about its possible overexploitation. The Peruvian stock was overexploited for several years and was recently severely depleted, leading to a moratorium on the fishery in 2002. Studies indicate that relaxed management coupled with overoptimistic assessments in the late 1990s contributed to driving the stock to a very low spawning biomass."[84]
- "The Patagonian grenadier is showing signs of heavy exploitation and is considered to be fully to overexploited, as is the southern hake due to the high catch of juveniles."[85]

Southern Ocean (FAO statistical areas 48, 58. and 88)

The Southern Ocean accounted for 0.2% of global landings in 2005. In the Southern Ocean, 23% of fish stocks have no room for further expansion, 19% have some room for further expansion, and the status of 58% is unknown.



- The major fisheries in the Southern Ocean are for krill and Patagonian toothfish. "Concern has been expressed within the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) that krill catches along ice-shelves may affect predators by locally depleting their food source."[86] Under the Convention, "management of fishing must not only aim to conserve the targeted species but take into account the impact of fishing on those animals that prey on, and compete with, the targeted species."[87] Additionally, despite catch limits and other management measures for Patagonian toothfish, "large illegal and unregulated fishing for toothfish has taken place in recent years (and) is of great concern, particularly in Area 58. This destructive activity threatens stocks of toothfish through overfishing."[88]

Endnotes

[1]United Nations Environment Program. In Dead Water: Merging of Climate Change with Pollution, Over-Harvest, and Infestations in the World's Fishing Grounds. February 2008. www.unep.org/pdf/InDeadWater_LR.pdf.

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[3] Halpern, B.S., Walbridge, S., Selkoe, K.A., Kappel, C.V., Micheli, F., D'Agrosa, C., Bruno, J.F., Casey, K.S., Ebert, C., Fox, H.E., Fujita, R., Heinemann, D., Lenihan, H.S., Madin, E.M.P., Perry, M.T., Selig, E.R., Spalding, M., Steneck, R., and Watson, R. (2007). A global map of human impact on marine ecosystems. Science 319: 948-952.

[4] FAO Marine Resources Service, Fishery Resources Division. Review of the state of the world marine fishery resources. FAO Fisheries Technical Paper. No. 457. (2005). Rome, FAO. pp. 235 ftp://ftp.fao.org/docrep/fao/007/y5852e/y5852e00.pdf.

[5] FAO Fisheries Technical Paper 457, pp. 10.

[6] Significant overreporting of catches from China in the 1990s have distorted FAO global landings and have complicated assessments for numerous stocks. Watson, R. and D. Pauly. (2001). Systematic distortions in world fisheries catch trends. 11/29/01. Nature. V. 414. http://www.mindfully.org/Water/Fish-Catch-Distortions.htm.

[7] Watson, R. and D. Pauly. (2001). Systematic distortions in world fisheries catch trends. 11/29/01. Nature. V. 414. http://www.mindfully.org/Water/Fish-Catch-Distortions.htm.

[8] FAO. Main stocks in capture fisheries. http://www.fao.org/fishery/topic/3442 More than 1,500 stocks and their population dynamic parameters are identified in FAO's POPDYN database, yet assessment information (including "unknown status") was only determined for 584 stocks.

[9] Ibid.

[10] FAO Fisheries Technical Paper 457, pp. 3.

[11] FAO. (2006). State of World Fisheries and Aquaculture (SOFIA). http://www.fao.org/docrep/009/A0699e/A0699E04.htm pp. 9.

[12] FAO Fisheries Technical Paper 457, Fig. A2.2, pp. 10.

[13] FAO Fisheries Technical Paper 457. Data generated from pp.10, by FAO statistical area. ftp://ftp.fao.org/docrep/fao/007/y5852e/y5852e00.pdf.

[14] http://www.fao.org/newsroom/common/ecg/1000505/en/stocks.pdf.

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[17] Myers, R.A., Baum, J.K., Shepherd, T.D., Powers, S.P., and Peterson, C.H. (2007). Cascading effects of the loss of apex predatory sharks from a coastal ocean. Science 315: 1846-1850.

[18] FAO Fisheries Technical Paper 457, Review of the state of world marine fishery resources, pp. 5.

[19] Shotton, R. FAO Regional Review of Northwest Atlantic. (2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B1. pp. 17.

[20] Maguire, J. FAO Regional Review of the Northwest Pacific. (2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B10. pp. 99.

[21] Of 584 stocks tracked by the FAO, information concerning status is available for 441 of them.

[22] FAO. (1995). Code of Conduct for Responsible Fisheries. Section 7.5. pp. 12. ftp://ftp.fao.org/docrep/fao/005/v9878e/v9878e00.pdf.

[23] Ibid.

[24] Ibid. pp. 13.

[25] Ibid. pp. 188. The North Pacific pelagic armourhead fishery reports more than 200,000 MT of catch, yet no trace of this fishery is found in the FAO Nominal Catchings and Landings Database, the largest and most comprehensive global record of fish catches. Additionally, the FAO database reports landings of orange roughy for only three countries up to the year 2000, yet working group contacts show that at least seven countries have harvested the species from the Indian Ocean.

[26] The following analysis is largely drawn from FAO Fisheries Technical Paper 457, Review of the state of world marine fishery resources, (2005). Data on stock status is derived from Table D8. Catch statistics are from FAO 2005 world marine capture production. ftp://ftp.fao.org/fi/stat/summary/a1a.pdf.

[27] FAO. Marine Resources Service, Fishery Resources Division. Review of the state of the world marine fishery resources. FAO Fisheries Technical Paper. No. 457. (2005). Rome, FAO.

[28] FAO. World capture production in marine fishing areas. ftp://ftp.fao.org/fi/stats/summary/default.htm#capture._Table A-1(a).

[29] Shotton, R. FAO Regional Review of Northwest Atlantic. (2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B1. pp. 17.

[30] Ibid.

[31] Ibid. pp. 18.

[32] Ibid. pp. 19.

[33] Ibid. pp. 20.

[34]Maguire, J. FAO Regional Review of Northeast Atlantic. (2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B2. pp. 23.

[35] Ibid. pp. 30.

[36] Cochrane, K. FAO Regional Review of the Western Central Atlantic. (2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B3. pp. 40.

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457, Review of the state of world marine fishery resources. Section B4. pp. 43.

[38] Ibid. pp. 45.

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[41] Lleonart, J. FAO Regional Review of the Mediterranean and Black Sea.(2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B5. pp. 60-61.

[42] Csirke, J. FAO Regional Review of the Southwest Atlantic. (2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B6. pp. 68.

[43] Cochrane, K. FAO Regional Review of the Southeast Atlantic. (2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B7. pp. 81.

[44] Ibid. pp. 84.

[45] Ibid.

[46] Shotton, R. FAO Regional Review of the Western Indian Ocean. Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B8. pp. 93.

[47] Ibid. pp. 93.

[48] Ibid. pp. 88.

[49] Ibid. pp. 91.

[50] De Young, C. (ed.) Review of the state of world marine capture fisheries management: Indian Ocean. FAO Fisheries Technical Paper. No. 488. Rome, FAO. (2006). 458p.

[51] Martosubroto, P. FAO Regional Review of the Eastern Indian Ocean. (2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B9. pp. 97.

[52] Ibid. pp. 94.

[53]Maguire, J. FAO Regional Review of the Northwest Pacific. (2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B10. pp. 99.

[54] Ibid. pp. 100.

[55] Ibid. pp. 101.

[56] Ibid. pp. 102.

[57] Maguire, J. FAO Regional Review of the Northeast Pacific. (2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B11. pp. 107.

[58] Ibid.

[59] Ibid.

[60] Martosubroto, P. FAO Regional Review of the Western Central Pacific. (2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B12. pp. 109.

[61] Ibid.

[62] Ibid.

[63] Ibid. pp. 111.

[64] Ibid.

[65] Ibid.

[66] Ibid. pp. 112.

[67] Csirke, J. and M. Tandstad. FAO Regional Review of the Eastern Central Pacific. (2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B13. pp. 114.

[68] Ibid. pp. 115.

[69] Ibid. pp. 117.

[70] Ibid. pp. 119.

[71] Ibid. pp. 118.

[72] Ibid.

[73] Ibid.

[74] Ibid.

[75] Ibid.

[76] Ibid. pp. 118-119.

[77] Shotton, R. FAO Regional Review of the Southwest Pacific. (2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B14. pp. 128.

[78]Csirke, J. FAO Regional Review of the Southeast Pacific. (2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B15. pp. 134.

[79] Ibid. pp. 138.

[80] Ibid. pp. 134 -135.

[81] Ibid. pp. 135.

[82] Ibid.

[83] Ibid. pp. 136.

[84] Ibid. pp. 137.

[85] Ibid.

[86] Shotton, R. FAO Regional Review of the Southern Ocean. (2005). Fisheries Technical Paper 457, Review of the state of world marine fishery resources. Section B17. pp. 161.

[87] Ibid.

[88] Ibid.

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