Testimony for The House Subcommittee on Fisheries, Wildlife and Oceans will hold an oversight hearing entitled, "Wildlife and Oceans in a Changing Climate."

by

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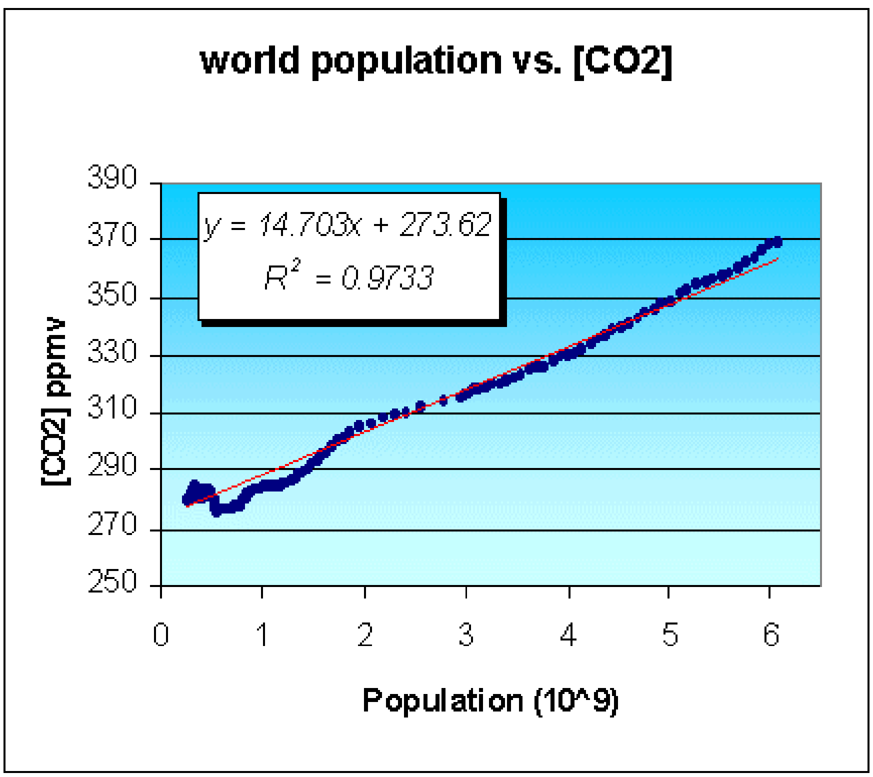
What do we know about Climate Change, The Future and Humanity?

We know for certain only two things. The first is a matter of history rather more than science: namely, that since about 1860, when accurate temperature records were first collected on a comprehensive basis, northern hemisphere temperatures have risen by about 0.6°C; and that this coincides with a steady growth in the amount of carbon dioxide in the atmosphere, a proportion of which is a consequence of industrial and other man-made emissions.

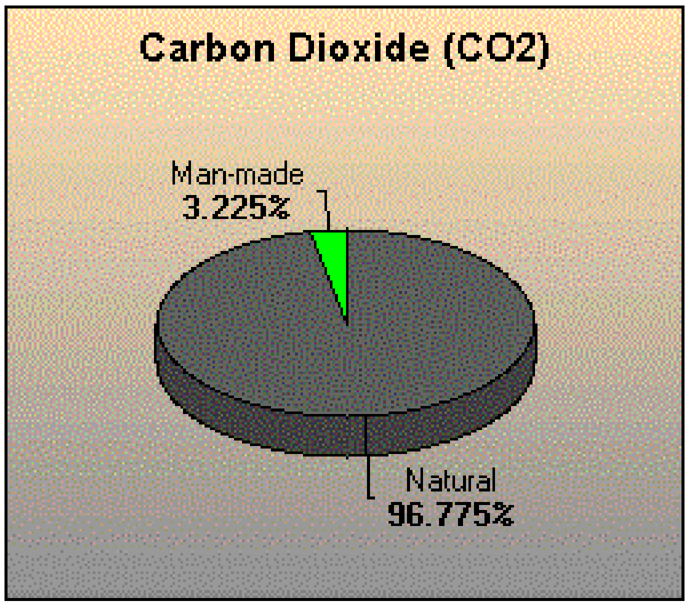
The second is that our planet is kept from being too cold for life as we know it to survive by the so-called greenhouse effect, which traps some of the heat from the sun's rays. This is overwhelmingly - somewhere between 75 and 95 per cent - caused by clouds and other forms of water vapor; and the carbon dioxide in the atmosphere accounts for much of the remainder. But so great is the uncertainty of climate science that it is impossible to say - and it is hotly disputed - how much of the modest warming that has been experienced since 1860 is due to the man-made increase in carbon dioxide.

We also have some opinions that CO2 levels and Humanity are related -



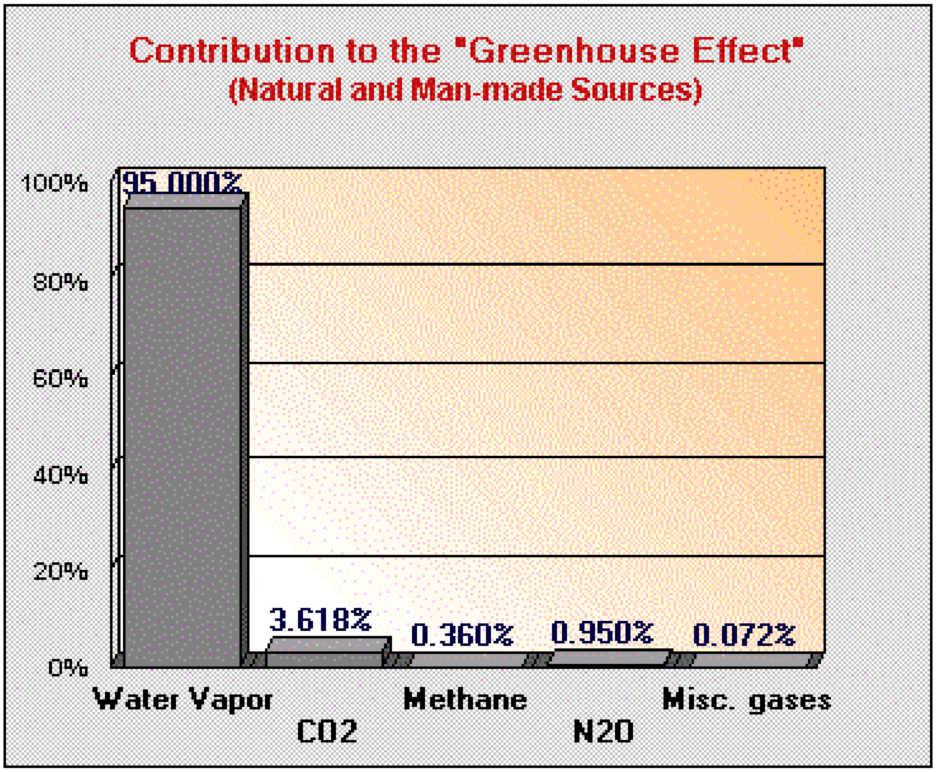
What is poorly recognized is that Global Warming since the Little Ice Age period of extreme low temperatures promoted the growth of both human population – and CO2 levels – as will be shown.

During the period since 1860, for which we have accurate temperature records, the picture is complicated. While the amount of man-made carbon dioxide in the atmosphere has, since the industrial revolution, steadily increased, the corresponding temperature record is more cyclical, displaying four distinct phases: 1) Between 1860 and 1915 there was virtually no change in northern hemisphere temperatures; 2) between 1915 and 1945 there was a rise of about 0.4°C; 3) Between 1945 and 1965 the temperature fell by about 0.2°C - and alarmist articles by various folks began to appear, warning about the prospect of a new ice age; and 4) between 1965 and 2000 there was a further increase of about 0.4°C, thus arriving at the overall increase of 0.6°C over the 20th century. Although, so far this century, there has been nothing to match the high temperature recorded in 1998, it would be rash to assume that this latest upward phase has ended. We know, however, that CO2 will continue to rise – as human activities and their survival in general are still growing: However - the human CO2 emissions remain a rather small component within the Global CO2 Cycle.

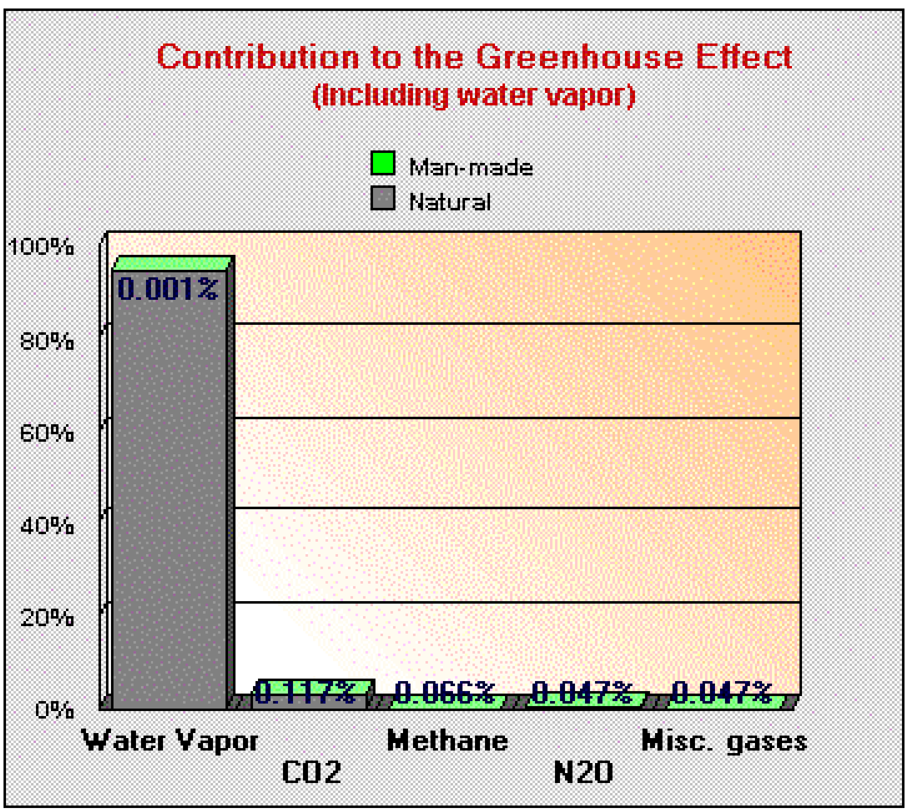


The IPCC Global Climate Change models assume that the recorded warming during the 20th century was entirely caused by man-made emissions of greenhouse gases, of which carbon dioxide is clearly the most important. This may be true; but equally it may not be. There are, for example, climate scientists who believe that the principal cause has been land-use changes, in particular urbanization (the so-called Urban Heat Island effect – as per Addendum 1 - a note by James Goodridge, retired California State Climatologist – who has been collating the State Observations since the early 1950s), and to some extent forest clearance for farming. But much more important is the fact that the Earth's climate has always been subject to natural variation, nothing to do with man's activities. Again, climate scientists differ about the causes of this, although most agree that variations in solar influences play a key part.

What is too often ‘buried’ is the fact that water vapor, the dominant component of the Earth’s heat balance/transfer system, is affected by may variables, including the surface wind speed, Equatorial Deep Convection processes, linked to the higher latitudes via the atmospheric Hadley Circulation and related precipitation cycles, and the Earth’s rotation – which along with the vast complex of ocean circulation dynamics comprise the timetables of Earth’s Energy Balance System, little or none of which is under any specific control by humans, other than at very local scales, e.g. urban/farm environments.



Human contributions to the Total 'Greenhouse Effectors' are quite small.



Total Human contribution to Green House effect = ~0.278% - not very great portion.

Needless to say, these confusing issues are likely to enhance future problems, if not dealt with correctly, and the more appropriate empirically based science rather than over-parameterized modeling continued. In my own rather complex field of Applied Fisheries Oceanography - we have suffered a rather odd parallelism with Climate Change Science - as modeling has taken over empirical observation based approaches to forecasts – and has resulted in many poor management decisions.

In February 2006, at the ASLO/AGU/CLIOTOP meetings in Hawaii I presented a lecture entitled - A Brief History of Applied Fisheries Oceanography - Part II - The Role Of CLIOTOP and TOPP in Revitalizing Ocean Sciences: In Short: "Underlying the basic responsibilities of resource management are very important questions requiring careful study, and long-term monitoring efforts in order to validate and upgrade conventional methodologies. While Ecosystem Modeling has become an academic field of general interest, the empirical observations necessary to build and implement effective models are rarely available, creating many examples of unreliable and unverified model results, that too often simply do not represent anything of real utility. E.G., Models that don't reflect environmental contextual changes, directly, such as changes in thermal habitats, related production patterns, and direct species responses to well described known forces, other than simplistic Top-Down Trophic Energy Transfers, cannot reliably provide the needed insights necessary to either explain past changes, or project potential future changes. The last half century of poorly applied 'equilibrium-based' theories, and collapse of most or all the important contextual variables into a single 'parameter' - often held constant - has resulted in the chaos that we see everywhere in stock assessments, management decisions, and resource collapses. A summary of historical efforts to move beyond 'context-free' management paradigms is provided. These many efforts have undergone several 'bloom-and-bust' cycles as generational changes in applied theory, and thus funding focus have been legislated over the years. The strong recent efforts to get back onto the oceans, working with knowledgeable commercial folks, and creating new technologies and better data sets from archival tags deployed on the various species has revolutionized ecological science, in general, but has yet to be integrated into the management procedures, or ocean science, in general. This is the future of applied fisheries oceanography."

In fact. I have been working on trying to resolve this problem by working with other on the issues in-situ in the eastern Pacific high seas fisheries since 1967, and then expanded westward into the southern Pacific, and then globally, since the late 1970s. I worked closely with those individuals who had the capabilities to both map observational data, and create time series from which insights could be gained. I then applied my own experience in working with upper ocean thermal and O2 profiles in explanations of changes in animal behavior and the changes in vulnerability of a broad array of ocean species to various fishing gear types, and helped those in developing regions 'optimize' their yield per unit effort, and minimize both their energy usage, and by-catch.

Eventually, on returning from my international efforts, tio the USA in 1983 – I discovered that our ocean observation programs were amongst the most devastated and poorly supported of the many fishing nations I had been working with. On the other hand, there were many related fields of science, from paleoclimatology to coping with regional weather that were well studied, and insights were shared routinely at various annual conferences, of which, I discovered the most eclectic (and often most irreverent) was the Pacific Climate Conferences held in Monterey Bay since 1984 – where I was invited in 1986 and showed the NOAA archived film of the GOES-E and GOES-W satellite imagery of the entire sequence of processes related to the El Niño of 1982-83 – starting with Pacific-wide coverage from January 1981 – until march 1983. My major contribution to this eclectic group was that I ran the sequence 'backward', after asking the audience to chose their particular locale of interests – and allowed them to track any features that affected these locations back to its source, usually well away from the locale – in fact, half a world, and months away from what they were interested in.

I soon found myself working closely with James D Goodridge, retired State Climatologist, on the source of the changes observed in the State of California, since r4ecords began in the later 1800s. Goodridge had learned about Anthropogenic Forcing of Urban Temperature Trends in California" – from decades of changes he observed, since he started this research in the early 1950s – and has been updating those records routinely since he retired in 1983. (A brief statement of his in addendum 1)

As we read both the news releases and 'professional Journal' articles about the pending calamities related to Global Warming it is too often not made clear that these are merely hypotheses – not more than the results of computer calculations based on limited understanding of causalities, and modifiers on various time and space scales. One example, of many similar issues is the infamous Conveyor Belt dialog- which Carl Wunch, of MIT, made very relevant statements about last year: Correspondence Nature 428, 601 (2004) - Gulf Stream safe if wind blows and Earth turns

Quote - Sir - Your News story "Gulf Stream probed for early warnings of system failure" (Nature 427, 769 (2004)) discusses what the climate in the south of England would be like "without the Gulf Stream". Sadly, this phrase has been seen far too often, usually in newspapers concerned with the unlikely possibility of a new ice age in Britain triggered by the loss of the Gulf Stream.

European readers should be reassured that the Gulf Stream's existence is a consequence of the large-scale wind system over the North Atlantic Ocean, and of the nature of fluid motion on a rotating planet. The only way to produce an ocean circulation without a Gulf Stream is either to turn off the wind system, or to stop the Earth's rotation, or both.

Real questions exist about conceivable changes in the ocean circulation and its climate consequences. However, such discussions are not helped by hyperbole and alarmism. The occurrence of a climate state without the Gulf Stream any time soon - within tens of millions of years - has a probability of little more than zero.

Carl Wunsch - Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, Massachusetts 02139, USA"

And then – consider that many of us have been working on these issues for a long while, based on the early works of folk such as those trying to resolve the changes in marine ecosystems from the Baltic and Northeast Atlantic at the end of the 19th Century, E.G.

The first president of ICES - the International Council for the Exploration of the Sea – spent decades researching the relationship between weather and fisheries:

Pettersson, Otto, 1912, The connection between hydrographical and meteorological phenomena: Royal Meteorological Society Quarterly Journal, v. 38, p. 173-191.

Pettersson, Otto, 1914a, Climatic variations in historic and prehistoric time: Svenska Hydrogr. Biol. Komm., Skriften, No. 5, 26 p.

Pettersson, Otto, 1914b, On the occurrence of lunar periods in solar activity and the climate of the earth (sic). A study in geophysics and cosmic physicss: Svenska Hydrogr. Biol. Komm., Skriften.

Pettersson, Otto, 1915, Long periodical (sic) variations of the tide-generating force: Conseil Permanente International pour l'Exploration de la Mer (Copenhagen), Pub. Circ. No. 65, p. 2-23.

Pettersson, Otto, 1930, The tidal force. A study in geophysics: Geografiska Annaler, v. 18, p. 261-322.

More recently reviewed by Julia Lajus – a Russian Social Scientist:
http://www.meteohistory.org/2004polling_preprints/docs/abstracts/lajus_abstract.pdf
Influence of weather and climate on fisheries: overview of emergence, approval and perception of the

idea, 1850 –1950s. Julia A. Lajus St. Petersburg Branch of the Institute for the History of Science and Technology, Russian Academy of Sciences, and Centre for Environmental and Technological History, European University at St. Petersburg

"Fishermen have long known that fisheries appear and disappear in time. Such events were attributed to changes in fish migration routes, harmful growth in numbers of natural predators of fish, and to the human impact: overfishing and water pollution (Smith, 1994, pp. 21-34). To note that weather, especially the changes in wind direction, could influence fisheries, was easier than to suppose that large periods of fish abundance could be connected with the fluctuation of climate. For example, Karl Ernst von Baer, famous German zoologist, who worked in Russia and in addition to many diverse activities was a head of several expeditions which surveyed the state of fisheries in 1850-s, explained the severe decline of herring fisheries during several years in the eastern part of the Baltic Sea by very cold and windy springs occurred these years. He supposed that the winds pushed out the spawning herring from their usual spawning grounds (Baer, 1860). But at the same time he did not apply this kind of argumentation when he discussed the possible causes for the cessation of the very prosperous herring fisheries in Bohuslan region on the western coast of Sweden in the beginning of the 19th c. He supposed instead that it was the human-induces pollution due to fish oil production. For the first time the climatic explanation for the periodicity of these fisheries was suggested by Axel Ljungman in Sweden (Ljungman, 1882). He noted that the herring catches varied cyclically with a period of the fifty-year sunspot cycle and assumed that this relationship might be explained with changes in the weather. However, he was not able to propose the mechanism for that connection.

When the International Council for the Exploration of the Sea (ICES) formed its Committees in 1902, they were named according to the main problems, which understanding would provide the better knowledge of the reasons of fluctuation of catches in fisheries – Migration Committee and Overfishing Committee. Hydrographical Committee was established in 1905. While the importance of studies of the environment for understanding the distribution of marine life was the core idea which led to the foundation of the ICES, during several decades the interdisciplinarity of research efforts was proposed but not fully achieved. According to T.R. Parsons this dichotomy continued through the 1960s: fisheries biology concentrated mostly on population dynamics, excluding the role of environment in controlling the absolute abundance of various fish species (Parsons, 1980). The exception was the situation in Russian marine studies where fishery science was merged with oceanography several decades earlier, forming the fisheries oceanography. Interest to the environmental forces was very much pronounced in Russian biology at the expense of the development of population modelling.

While it was "the struggle to link fish to their ocean environment" within the ICES (Rozwadowski, 2002, pp. 111 -145), to link fish with the climate was even more difficult task, as the relations between ocean and the atmosphere remained enigmatic. In 1910s Johannes Petersen from Denmark and Otto Pettersson from Sweden discovered connections between the water temperature in the North Atlantic and the position of the air pressure minimum (Icelandic low), but the nature of these connections were not obvious (Petersen, 1910, Pettersson, 1912).

However, already the first ten years of studies under ICES umbrella had resulted in the discovering of the unexpectedly high variability in the ocean. As it was pointed out in the ICES Memorandum in 1923: "We started from the assumption that the hydrographic conditions, as well as the fishlife and the plankton of these tributaries of the Atlantic, seemingly so well separated both from each others and from the main basin of the Ocean by narrow channels and submarine thresholds, would remain on the whole stationary, subject only to seasonal influences from the atmosphere. Experience has led us to other views. There exists an interchange of waters of living marine animals and plants between the different parts of the Ocean on a far greater scale than our most experienced oceanographers and biologists considered to be possible twenty years ago" (Pettersson, Drechsel, 1923). The notion of far greater scale of variation in both physical and biological phenomena than it was considered as real or even possible was a main tendency in the discovering the environmental forces driving living organisms in general. It was especially true for the climate, which was perceived as much more stable than it occurred to be. For example, Russian biologist and geographer Leo Berg in his book "Climate and life" (Berg, 1922) compared climate with a species and weather with an individual, arguing that weather is very changeable, while climate could changes only very slowly. The same was an opinion of Russian oceanographer Nikolai Knipowitsch who was the Russian delegate in ICES before the WWI. He considered the Gulf Stream system as a stable one and thus was extremely surprised when the significant increase of the water temperature in the Gulf Stream branches in the Barents Sea was discovered in 1921 (Knipowitsch, 1921). In 1926 Otto Pettersson wrote a classical paper, in which he demonstrated very clearly the connections between catches of herring and winter temperatures in the Kattegat channel (Pettersson, 1926, see also Svansson, 1999).

The significant warming in the North Atlantic which started in the 1920s and was more pronounced in the 1930s provided many new evidences of the influence of climate on fish distribution. The effect was especially visible at the north-west - in the Greenlandic waters and at the north-east – in the Barents Sea. A.S. Jensen and P. M. Hansen (1931) observed the expansion of cod and halibut along the west coast of Greenland in comparison with 1908 and the 1920s. The warming of the Barents Sea also was accompanied by the large changes in the distribution of stocks of commercial fishes. The tremendous amount of herring never seen before near the Russian coasts of the Barents Sea was observed in 1932-34. Herring was observed even in the mouths of large Siberian rivers (Esipov, 1938; Galkin, 1940). In the same years cod appeared in the quantities suitable for fisheries at the eastern parts of the sea and even near the Novaya Zemlia costs (Esipov, 1935). Thus "warming of the Arctic", which was noticed firstly by climatologists and oceanographers became an important issue for biologists. In Russia it was summarized in 1934 by Sergei Averintsev (Averintsev, 1934) for the Barents Sea and more generally by Leo Berg (1935).

The perception of the rapid climatic changes and their influences on fish resources was rather contradictory. Most of the scientists considered this as the random event, others tried to discuss this in terms of the periodicity. Both considerations were very unfavorable for fishery managers who would like to have in hands the control sticks for the ruling of fish stocks while referring to the climatic factors moved them far away from this practical task. Contradiction between the supporters of the overfishing as a main factor influencing the fish stocks and scientists who believed more in the environmental forces was appeared very clear in the dispute between W. F. Thompson and Martin Burkenroad over the fate of the halibut stock in the Pacific (Smith, 1994, pp. 267-276).

The marginal but interesting example came from the Soviet history: in 1930s it was a period when managers and authorities opposed the very idea of influence of climatic changes upon fish stocks, because it put serious limitations to the will of reconstruction of nature by the human voluntary. The paper by Averintsev mentioned above became a point of severecriticism, because the linkage between the warming of the Arctic and the increasing of the catches of herring and cod led to the assumption that when the warming will stop or the cooling will start (the climate is so uncertain and mysterious thing!) the catches undoubtedly will reduce. This pessimistic view was not appropriate for the optimistic position of the conquerors of nature and for the planned Soviet economy.

Growing understanding of the importance of climate influence led to the organizing of special meeting on this subject in 1948 (ICES, 1948). H. W. Ahlmann in his introductory speech pointed out that extent of warming of the northern waters which was documented in 1930-1940s was part of a global change of larger scale pronounced by increasing of air temperature, receding glaciers, decreasing Arctic ice extent and thickness. From that time we could trace the formation of the interdisciplinary research program intended to the discovering of the mechanisms of the influences of climate changes on fish. The development of this research program which core was the assumption that the climate changes have significant influence on fish and fisheries was smoothed by the describing of several important phenomena such as the Great Salinity Anomaly, North Atlantic Oscillation and El Nino, which were connected with the dynamics of the fish populations (Drinkwater, 2000).

After summarizing book by D. H. Cushing (1982) the notion that climate change could influence the fish resources and therefore fisheries became a commonplace, but the question is still very important and new facts and correlations are discussing by fishery scientists in cooperation with climatologists (Cod and Climate Change, 1994 and manyothers). The real issue is whether there is a direct causal link, or these are merely correlated consequences of larger scale processes (Sharp, 2003).

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Meanwhile, back in 1987 I wrote the following essay:

Averaging the Way to Inadequate Information in a Varying World

"At the Benguela 86 Symposium one of the participants decided to make a very strange recantation. There was sufficient evidence, in his view, to suggest that there was no reason to do the causal research in fisheries-related marine ecology, once the conventional average fishery information or parameter estimates were available. You could be right more often using average expectations in your data than if you used any three random variables with combined explanatory capabilities of up to 75%. He then proceeded to exemplify his conclusions from his analyses.

This statement came as a surprise - and disappointment - as it came from an exceptionally talented mathematical analyst. Perhaps doubly so, since among the several dozen other presentations at this symposium there were also very memorable contributions that evidenced the value of understanding the causal sequences of climatic to, oceanographic, to ecological events and patterns, that characterize the dynamic Benguela Current Ecosystem, in particular its periodic reversion from one quasi-stable state to another.

I suspect that, once stated, such a position will make it more difficult to induce such "enlightened" folk to recognize the logical errors that lead to these wrong conclusions. As Jorge Csirke and I concluded after our 1983 review of the Changes in Abundance and Species' Composition of Neritic Fish Resources, fisheries stock assessment would be in a very different state if the North Sea were subject to El Niño events.

In retrospect, I think that any argument for use of simple averages is a strong signal that it is about time for such analysts to be removed to the back seat, or somewhere that will minimize data fatigue. Recent decades have been the hey day for the near-miss regression/correlation approach to modeling environmental affects on resources populations. There is a subtle philosophical twist attendant to the failure of these partial models to forecast ad *infinitum* the patterns of any populations responses to regimes outside the models' basis, of reference period.

There is no reason to expect that the low-level modeling that we have accomplished could forecast any but past responses – That is ‘if’ the signals were strong enough to make projections from. Yet, we assume average responses without querying the potential for any other dominant variables to emerge.”

The most important relevant realization that needs to be made is the following:

THE AVERAGE FISH DIES WITHIN ITS FIRST WEEK OF LIFE!

And - Where does this leave our mathematician? With a lot of surviving, not-so-average fish. In fact the average conditions of the ocean will not support most fish life at all. Therefore, there must be some alternative way to organize the science if we are ever to reach the objective of forecasting even the less subtle aspects of marine populations such as relative abundance or distribution. I think that the solution is for fisheries researchers to go back to the basic questions of elementary biology. What mechanisms do the various populations have, and at what developmental stages, that allow them to survive local environmental perturbations? What are the conditions to which these individuals are adapted, and finally, what perturbs these conditions in time and space?

We should no longer attribute meaning to the word "average" in the context of any marine population. There should be a sense of the basic fitness of individuals on local time and space scales, not of a median: or population mean. In the context of marine environments, there is neither a mean expectation, nor a sequence of biological responses that have proven to be inviolable. Once we throw away our averaged or Atlas concepts we can experience dynamic changes, be they merely subtle diel processes, lunar responses, onward to greater time and energy scales.

Any given time period as short as man's expected lifetime or less may not offer as great a spectrum of perturbations and responses as have been experienced by a particular population or ecosystem, particularly climate regimes. For example, the general heating trend that has been experienced in the eastern Pacific Ocean since the late 1960's, which culminated with the 1982-83 El Niño, not only returned the physical environment to a previous "normal" state for the epoch that ended some 5,000 years ago, but many species that had somehow managed to retain "footholds" within the more recent habitat, that thrived in the other warmer state, bloomed, and replaced the more recent faunas for a short period. Where is the utility of the average concept in this context?

Progress over the last two decades toward an integrated, ecologically based fisheries monitoring and management regime has resulted from the near kaleidoscopic variability of the marine environment in response to usual decadal and epochal scale climate variabilities - global and local phenomena that could not be ignored.

Why has our mathematician given in? In the Benguela Current, recorded exploitation patterns of the fisheries have provided only short and incomplete information about these cyclic and aperiodic processes. The stability of the anchovy production since the collapse of the sardine population in that system may be completely artifactual, yet it lulls those interested only in the analyses of fisheries production into a sense of security which is likely to be short-lived. While it is plausible that averages could provide adequate protection in a system which experiences only subtle perturbations, I doubt that the Benguela or any other Eastern Boundary Current would qualify.

Fisheries management should be about tesselations; careful analysis of not only man's harvests, but also the causal physical-climatic-oceanic processes, near and remote, that initiate ecological perturbations.

Emanating from this cascade of physical and biological signals are the unique experiences of surviving individuals, not the deadly averages. For Example: Addendum 2 - my article in 1981 ICES Report, 178:158-160. COLONIZATION IN FISHES - SOME INFERENCES CONCERNING REQUIREMENTS AND OPPORTUNISM IN THE SEA –

Twenty years later I encountered the works of Leonid Klyashtorin, and had him introduced to my colleagues at FAO Fisheries Department in Rome. He was invited to come and present his work, and then asked to write a Technical Report – for which I was asked to do the final English editing for publication, Klyashtorin L.B. 2001.Climate change and long-term fluctuations of commercial catches: the possibility of forecasting. FAO Fisheries Technical Report No.410, 98pp. FAO of the United Nations, Rome. which is available online via this link:

http://www.fao.org/DOCREP/005/Y2787E/y2787e01.htm#TopOfPage

I followed up on this work, and my collaborations with Joseph Fletcher and others, and wrote another technical report - "Future climate change and regional fisheries: a collaborative analysis" – available from FAO Library via this link:

<ftp://ftp.fao.org/docrep/fao/006/y5028e/y5028e00.pdf>

In which you can read my views on the consequences of future climate change on regional fisheries around the globe.

I have just finished editing the English translation of Leonid Klyashtorin and Alexey Lyubushin's 2005 Russian language 234 page book on "Cyclic Climate Changes and Fish Productivity" - a long overdue re-introduction to the means for coping with the comings and goings of major fisheries populations. It will be available soon from the VNIRO Publisher in Moscow.

There are far more relevant bits and pieces of historical phenomena and observation-based research on library shelves in non-English language cultures than has been appreciated by many western scientists – and these need to be brought into the light so that western science might ‘catch up’ – and move forward. More observations are needed and should receive priority over wasteful modeling ventures –

Enough said.

Addendum 1

On Global Warming
A California Perspective

By Jim Goodridge -- California State Climatologist (Retired)
Clips from presentations made in 8/2006

There are two schools of thought on Global Warming. One is based on the concept attributed to Richard Feynman "Shut Up and Calculate". This is the concept was apparently used by Jim Hansen et al of NASA. He and others, who would average all the temperature records together, praying that the rising trends would average out the declining trends and yield a true idea of the actual long term trends. This reflects the consensus of the Intergovernmental Panel on Climate Change: that global temperatures are increasing due to anthropomorphic causes. In the words of Sam Harris "While consensus among like minds may be the final arbiter of truth, it cannot constitute it."

Another school of thought is to look at each temperature record individually and consider the influences that are acting on each record separately. When the trend is strongly upward, the influence of land use changes in the area of the measurement station needs to be considered.

About half of California's temperature records are from urban areas. They show a strong rising trend. The rural records show a nearly flat or no increase. The neutral trend in the rural areas is completely overwhelmed by the massive upward increase of the urban temperature trend. When the urban and rural records are averaged together the grossly distorted urban trends prevail.

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Needless to say the areas around the urban temperature measuring stations have experienced severe land use modifications during the period of temperature measurement. This corresponds to the period of unprecedented population growth. These land use changes translate to increasing amounts of heat storage in pavement and in heated buildings. These changes result in large amounts of the recent thermal pollution the temperature records with respect to the early part of those same records.

The urban heat island affect was extensively described by Helmut Landsberg in his book The Urban Climate. The urban heat island is caused by urban waste heat and land use modification. This reflects solar heat storage in pavement and concrete for release during the night, added to radiation from urban waste heat sources. The large increasing mean daily temperatures in urban areas are driven by the sharply rising trend in the minimum daily temperatures. This is in response to nightly release of heat stored in pavement and concrete. Maximum daily temperatures do not reflect the same rising trends.

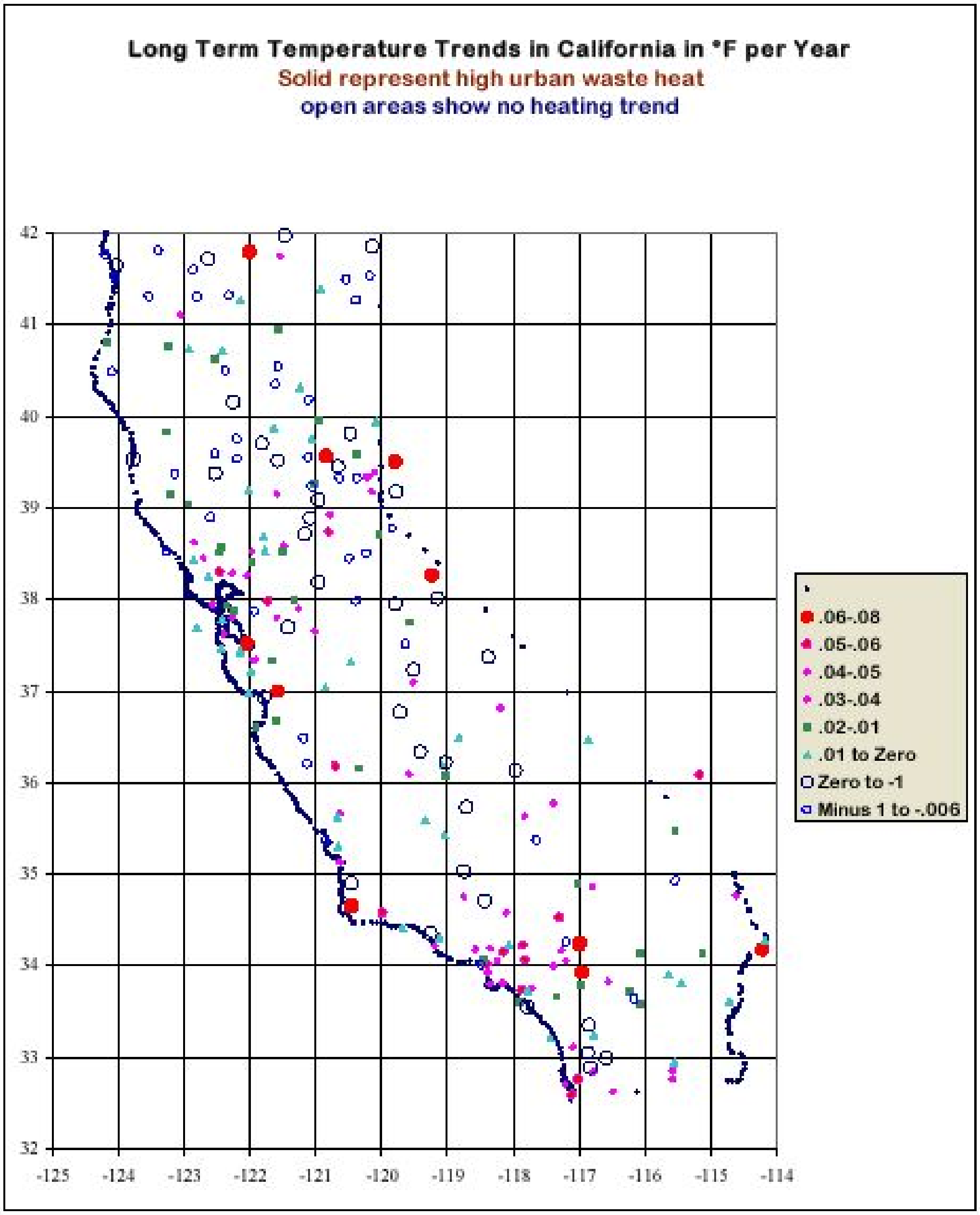
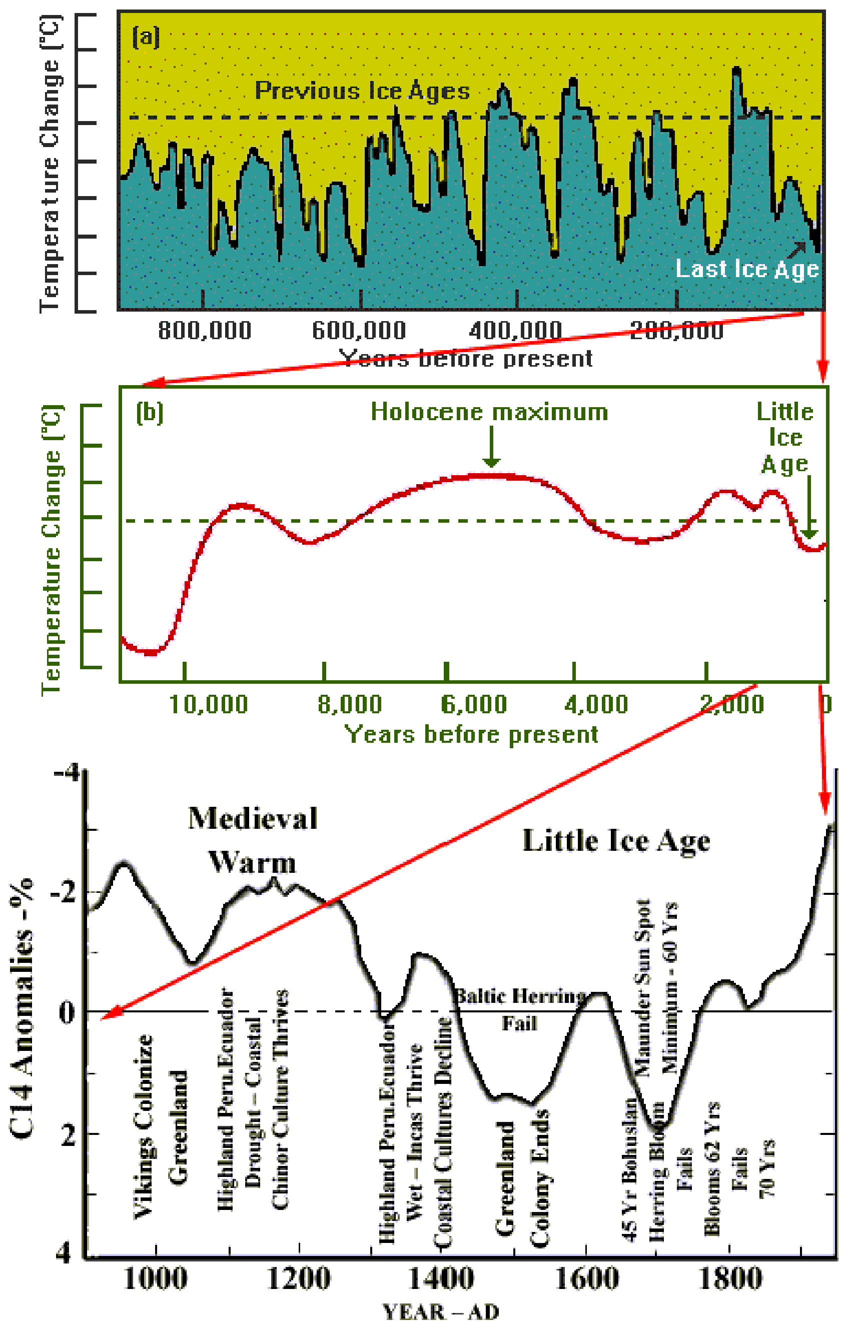


Figure 3: Long Term Temperature Trends in California in deg F per year

From a solar viewpoint the energy output of the sun or "Solar Constant" has been found to vary directly as the historic sunspot numbers. These were at lowest values of the recent millennium during the period from 1660 to 1710. This was the time of the Maunder Minimum of sunspot activity, with few or no sunspots. This also corresponded to the time when England's River Thames froze over. The ice supported a series of Ice Fairs mid river, just up stream from London Bridge.

The period 1300 to 1850 is referred to as the Little Ice Age. It was preceded by a warm period when Greenland was colonized over a thousand years ago. Earth's temperatures are still recovering from the cold times of the Little Ice Age, hence the retreating glaciers.



(Figure above from Sharp presentations)

Anthropomorphic global warming remains one of the "lies that bind" us to distorted view of a causal mechanism. To follow Feynman's suggested "Shut Up and Calculate" is to ignore the flaw of averages. Anthropomorphic global warming concept was "formed with inadequate evidence and can therefore be rejected with inadequate evidence" to again paraphrase Sam Harris.

There is a basic dishonesty using the concept of anthropomorphic global warming to justify conservation of natural resources. The conservation of natural resources is still an important and noble aim. The unprecedented numbers of the human population has inflicted an unprecedented demand on the natural resources as they are consumed for food, fiber, fuel and shelter. This human population explosion is inflicting unprecedented havoc on much of the natural area of California and of our planet.

List of State High and Low temperatures:

http://en.wikipedia.org/wiki/List_of_all_time_high_and_low_temperatures_by_state

Theodore Landscheidt (d2006) final (correct) ENSO Prediction for 2006-2007:

http://www.john-daly.com/theodor/new-enso.htm

Website –

Its All About Time - A Chronology of Events, Places, Ecological and Societal Impacts

< http://sharpgary.org/>

Addendum 2

Rapp. P.-v. Wen. Cons. int. Explor. Mer, 178:158-160. COLONIZATION IN FISHES - SOME INFERENCES CONCERNING REQUIREMENTS AND OPPORTUNISM IN THE SEA – Gary D. Sharp, FAO, Fishery Resources and Environment Division, Via delle Terme di Caracalla, 00100 Rome, Italy

Some of the least considered topics in fisheries research have been the initial colonizations and range extensions of species. The significance of these processes is obvious in proliferation of subspecies, and speciation and population cycles in fishes. All aspects have been treated, but a full appreciation of the spectrum of possibilities has yet to be made. The cosmopolitan species represent one extreme situation. A fundamental requirement is that there be a high degree of nomadism, with cohesion and sexual parity (similar stages of development) in the various nomadic elements (schools or shoals). The data providing insight into this process in cosmopolite species is the high degree of kinship in genetic sampling of highly mobile oceanic species (two species of tunas) (Sharp, 1978). For proliferation of the oceanic scale there must also be continuous "search and sample" processes in which the reproductive success rate is relatively high. Location of appropriate patches for larval development in oceanic species, particularly the cosmopolites, must be exemplary of opportunism in the most stringent sense. Many of the cosmopolitan species are not very long-lived, and their reproductive behaviour is relatively "cryptic". Their reproductive behaviour is different from the most discussed pelagic groups, the clupeids and engraulids, which are typically harvested most intensely during or just prior to their reproductive period due to their strong shoaling behaviour during this time. Localization of these reproductive aggregations is indicative of the tendency for these species to home on geographic phenomena which have historically provided them with successful conditions for reproduction. These conditions are just recently being subjected to vigorous examination required for determination of cause and effect relationships (Vlymen, 1977; Beyer and Laurence, this volume; Owen, this volume).

Resident or homing subspecies, races, or behavioural components in contrast to nomadic opportunists can be observed on all scales. In the California Current system, the anchovy and the sardine before its decline have been shown to have at least three geographic racial components with significant overlap between any contingent pair of genetic units (Vrooman and Smith, 1971). There is extreme racial complexity in the less mobile of the tropical tunas (e.g., yellowfin tuna in the eastern Pacific Ocean) and ocean scale population complexity of the more migratory cosmopolites such as skipjack tuna (Sharp, in preparation, Fujino, 1970). There are numerous indications of similar processes in the North Atlantic pelagics. Recolonization of fishing grounds where commercial quantities of one species or another have diminished to nil is exemplified by the Japanese sardine which has begun a slow march from its last bastion in the eastern pelagic zone of Japan to the Sea of Japan around the southern tip of Japan, nearly back to the historic range of distribution during the peak years of its exploitation (Kondo, 1978). This long slow march is characteristic of fishes with limited nomadic tendencies and exemplifies the relatively slow procession of colonization by such species in contrast to the more migratory oceanic species and forms.

The qualities of habitat which determine the population distribution are entirely distinct from those which truly determine recruitment. The larval habitat clearly has a more complex series of constraints, on smaller scales and geometries, than the adult or more mobile stages. The limited mobility, small size, and relative sensitivity of fish larvae to micro scale parameters places them in jeopardy at all stages. The homing species invest considerable energy in placing their eggs into the home habitat. If this home habitat has shifted or ceased to be appropriate for larval survival there is no hope for reproduction. Where the population habitat boundaries shift there is generally an effective reduction or increase in the potential larval habitat which directly influences reproduction success and realization of potential. Where the adult population habitat is shrinking one would predict a decrease in realization of reproductive potential. Where the adult habitat is expanding, if the adult population is not relatively nomadic, there is a tendency to under-utilize the larval habitat potential, yielding slower population growth than one could expect. In non-nomadic species, active transport by currents, wind stress field effects, diffusion, and sheer chance ultimately determines their rates of increase in both numbers and area.

Intermediate to these cases are species whose reproduction is not localized per se, but tends to be concentrated geographically due to the requirements of the larvae, whereas the adults and juveniles may be quite diffusely distributed and/or highly migratory, resulting in very different distributions at different life stages. In this situation species can even arrive at a "cosmopolitan" distribution.

If one concludes that the egg to larval **transformation period** is the greatest potential "bottleneck" period for a fish population, then one can also conclude that the complexities of the following life stages represent an evolutionarily successful egg's way of getting itself reproduced and redeposited in an appropriate environment. The subtle generation to generation responses to environmental trends and anomalies selects for either geographic flexibility, as observed in the nomadic opportunists, or numerical swarming as observed in the clupeids and engraulids, which is restricted, for success, to areas of relative year to year stability. The rise and fall of these localized populations is probably more characteristic and dramatic than the year to year biomass or number variations in the opportunistic nomadic forms. For example Table I shows the relative abundance (catch) variations in 25 local or regional pelagic fisheries from the years 1970 to 1977. All these examples have varied by more than 5 times during this period. No oceanic fisheries exhibited this level of apparent abundance variation within this period, apart from a few cases where political or economic factors other than resource availability have affected the total landings (FAO, 1977).

Table 1. Trajectories of catch trends since 1970.

Species	Area	(A) Peak catch	(B) Low catch	Ratio A/B	
Caranx hippos	West Africa	28 221	1 036	27.	+
Orcynopsis unicolor	West Africa	2 600	100	26.	—
Trachurus capensis	Southwest Africa	690 164	62 300	11.	+
Trichiurus lepturus	Southwest Africa	28 545	3 800	7.5	+
Trachurus trecae	Southwest Africa	273 700	31 298	8.7	—
Sardinella spp.	Southwest Africa	142 200	20986	6.8	—+
Scomber japonicus	Peru	65 000	8 700	7.5	+
Scomber japonicus	Northeast Atlantic	39 000	6 262	6.2	—
Rastrelliger spp.	Eastern Indian Ocean	16 300	2 000	9.2	+
Rastrelliger kanagurta	-Eastern Indian Ocean	203 100	35 403	5.7	—
Anchovies	Western Indian Ocean	118 062	16900	7.0	+
Psenopsis anomala	Northwest Pacific Ocean	13000	1 994	7.0	—
Sardinops melanosticta	-NW Pacific Ocean	1 420 512	16 900	84.	
Engraulis mordax	Eastern Pacific Ocean	289 002	44 600	6.4	+
Cetengraulis mysticetes	-East Tropical Pacific	168 081	15 551	10.8	+
Trachurus symmetricus	-Eastern Pacific Ocean	50 149	9400	5.3	+

Sarda chiliensis	Southeastern Pacific Ocean	74 700	4 341	17.2	—
Scomberomorus sierra	Peru	2 279	400	5.7	+
Engraulis ringens	Peru	13 059 900	907 175	16.	—
Sardinops sagas	Peru-Chile	1 467 555	68 600	21.	+
Trachurus trachurus	Peru-Chile	839 805	111 300	7.6	+
Thyrsitops lapidopodes	-Chile	7 200	630	11.6	—
Cetengraulis edentulous	-Venezuela	4965	850	5.8	—+
Decapterus russelli	Malaysia-Thailand	109 337	9 800	11.2	+
St Scomberoides spp.	-Indonesia-Philippines	5 186	500	10.	+

Plus and minus signs in the Table represent directions of trends during the reference period. Changes in both directions in the order indicated. The indication -—+ implies sharp changes in both directions, in the order indicated.

The apparent relative stability of the biomass of the broad ranging opportunist populations is due to both contributions of local populations and the shared risks taken by the large nomadic portions of these populations in coursing over their ranges in search of feeding grounds and hospitable spawning habitats. The dependence of local populations of oviparous fish on the stability or continuity of local processes conducive to larval survival is well recognized. Our ability to identify many of the "critical" characteristics is developing. Until these characteristics are identified and monitored there is little hope that it will be possible to logically predict recruitment trends.

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