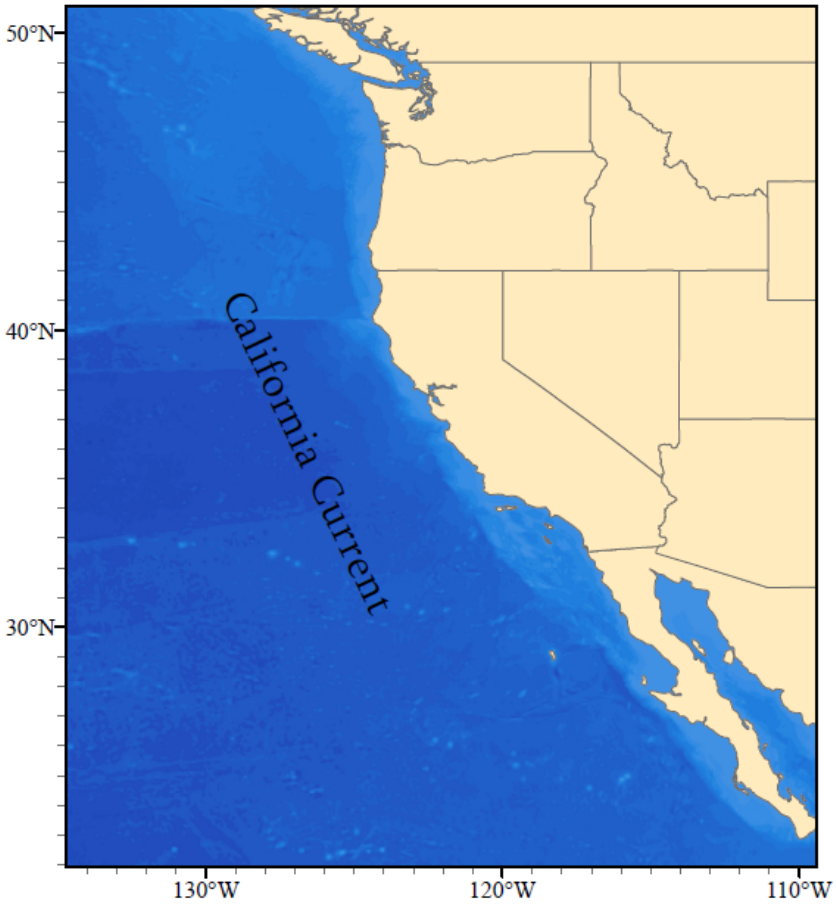
Climatic and Ecological Conditions in the California Current LME for Month to Month Year

Summary of climate and ecosystem conditions for Quarter 3, 2011 (June to August) for public distribution, compiled by PaCOOS coordinator Rosa Runcie (email: Rosa.Runcie@noaa.gov).
Full content can be found after the Executive Summary. Previous summaries of climate and ecosystem conditions in the California Current can be found at http://pacoos.org/



CLIMATE CONDITIONS IN BRIEF

- **El Niño Southern Oscillation (ENSO):** La Niña conditions have returned and are expected to gradually strengthen and continue into the Northern Hemisphere winter 2011-2012.
- **Pacific Decadal Oscillation (PDO):** A negative PDO event that began in June 2010 appeared to weaken through March, April and May 2011. However, the June Index value reversed the trend and the July 2011 value was strongly negative. The July Index value of -1.86 was the lowest value in 15 consecutive negative values and the lowest value since January 2000. In August, the PDO value remained negative at -1.74. The PDO is expected to remain negative through early 2012.
- **Water Temperature and Salinity at station NH 05, OR:** Sea surface temperature anomalies at station NH 05 (five miles from shore off Newport) show that upwelling was strong during the summer of 2011. Deep waters at station NH 05 were cold and salty during 2011, another indicator of relatively strong upwelling. Deep water was as salty in 2010 as in 2011 but colder by about 0.3°C.
- **Trinidad Head Line, CA Observations:** Recent observations along the Trinidad Head Line in Northern California show evidence of variable upwelling through the spring and summer months of

2011 in the form of pulses of cool, salty water on the shelf and corresponding phytoplankton blooms. Despite greater temporal coverage, recent data do not include signatures of upwelling as intense as has been observed in previous years.

- **Upwelling Index (UI):** Coastal upwelling indices were low in June and July with intensity moving north. Indices in August were moderate to high and indicated stronger than average August Coastal upwelling indices.
- **Madden Julian Oscillation (MJO):** The MJO index did not indicate significant MJO activity from June through early August. The MJO strengthened in August and increased in amplitude late-August.

ECOSYSTEM CONDITIONS IN BRIEF

- **California Current Ecosystem Indicators:**
  1. **Copepods:** Changes in copepod species richness track the PDO and MEI but with a time lag of a few months. The year 2011 has had negative richness anomalies since February, another good sign that ocean conditions have become favorable for juvenile salmon and other marine life.
  2. **Krill**
  3. **Juvenile Rockfish**
  4. **Coastal Pelagics:**
     Market Squid: California landings of market squid in May totaled about 4,000 metric tons (mt). Productive commercial fishing continued through June. Most of the catch came from southern Monterey Bay. Average ex-vessel price was $550/mt.
     Pacific Sardine and Pacific Mackerel: Both Monterey and southern California Pacific sardine and Pacific mackerel landings decreased January to March and then increased from June to July.
  5. **Salmon:** By the end of August, over 700,000 adult salmon and steelhead had been counted at the Bonneville Dam fishway, 250 kilometers up the Columbia River. By mid-September the season's cumulative total had increased to 1.2 million, with fall – Chinook, coho and stealhead runs contribution to the increase. At the run's end, the spring and summer runs together were about average and about 80% of the 2010 run. The fall Chinook salmon run brought about 200,000 additional fish across the Bonneville fishway, but by mid – September, the fall run remained about 90% of the ten – year average and 86% of the 2010 run. The coho salmon run was extremely strong in early September and by mid – September the 2011 this run has been about 90% of the average and the 2010 runs. The sockeye run of 186,000 salmon, that ended in July on the lower Columbia was 150% of average and 88% of 2010. The 2011 Frazer River run was estimated to be about 2.4 million sockeye.
  6. **Groundfish:** The Council adopted new assessments for Pacific ocean perch, petrale sole, spiny dogfish, sablefish, Dover sole, greenspotted rockfish, and blackgill rockfish for management decision-making as recommended by the Scientific and Statistical Committee (SSC). A new widow rockfish assessment was scheduled for further review by the SSC Groundfish Subcommittee at the September "mop-up" panel. The Council will consider adopting the assessments to be reviewed at the "mop-up" panel in November.
  7. **Pacific Hake**
  8. **Midwater species**
  9. **Sablefish**
  10. **Cassin's Auklet**
- **Highly Migratory Species (tuna, sharks, billfishes):** The Council directed the Highly Migratory Species (HMS) Management Team and advisory Subpanel to provide information to inform a decision on whether to change the current west coast swordfish fishery, tentatively scheduled for the March 2012 Council meeting.
- **Invasive Species**

- **Marine Birds and Mammals:**
- **Harmful Algal Blooms:**
  Washington: Washington's Olympic Region Harmful Algal Bloom (ORHAB) partnership monitors nine regular sites along Washington's outer coast for the presence of harmful phytoplankton species weekly. Please view the http://ww4.doh.wa.gov/gis/mogifs/biotoxin.htm site for the most current status.
  Oregon: July 1, 2011, the Oregon Department of Agriculture reported toxin concentrations in mussels exceeded regulatory closure levels and subsequently the fishery from the Columbia River south to Cape Mears were closed.
  California: During the second week of June, offshore of Santa Barbara the toxin concentration in shellfish had exceeded the federal alert level. Domoic acid levels at this site continued to increase throughout the month. These levels of domoic acid decreased below the detection limit by the first week of July. This decline was temporary, as the toxin level increased during the second week and exceeded the alert level the last two weeks of July. Domoic acid was not detected in any samples analyzed in northern California throughout the month of June and July. In August domoic acid was detected to above alert levels throughout California.
  A low level of the PSP toxins was detected in mussels collected from Portuguese Bend in the Palos Verdes region in July.
- **Dissolved Oxygen Concentration:** Oxygen concentrations in deep water at station NH -05 off Newport fell below the threshold of 1.4 ml L^{-1} on multiple occasions during 2011. The lowest oxygen concentration measurements of the six year time series were recorded in 2011, on 1 and 13 September. These values are lower than any recorded by us in 2006, a year of a major fish kill, thus if low oxygen concentrations persist for many more weeks, it is likely that another fish kill will occur soon.

CLIMATE CONDITIONS

El Niño Southern Oscillation (ENSO):

Source: **http://www.cdc.noaa.gov/people/klaus.wolter/MEI/mei.html,**
http://www.cpc.noaa.gov/products/analysis_monitoring/enso_advisory/

During June and July 2011, ENSO-neutral conditions continued and were reflected in the overall pattern of small sea surface temperature (SST) anomalies across the equatorial Pacific Ocean. La Niña conditions returned in August 2011 due to the strengthening of negative SST anomalies across the eastern half of the equatorial Pacific Ocean. While it is not yet clear what the ultimate strength of this La Niña will be, La Niña conditions have returned and are expected to gradually strengthen and continue into the Northern Hemisphere winter 2011-2012.

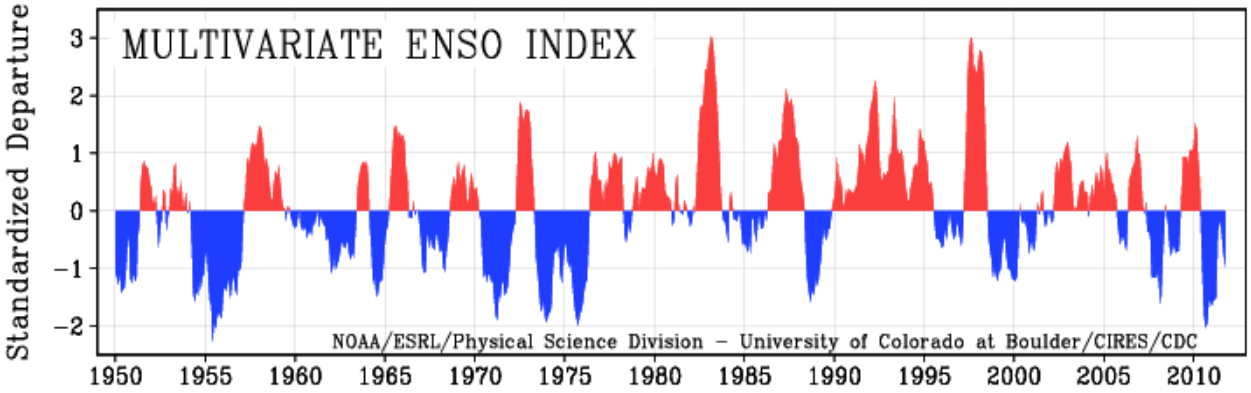


Figure 1. NOAA Physical Sciences Division attempts to monitor ENSO by basing the Multivariate ENSO Index (MEI) on the six main observed variables over the Pacific. These six variables are: sea-level pressure, zonal and meridional components of the surface wind, sea surface temperature, surface air temperature, and total cloudiness fraction of the sky.

Central & Eastern Equatorial Pacific Upper-Ocean (0-300 m) Heat Content Anomalies:

Source: The Coast Watch **http://coastwatch.pfel.noaa.gov/elnino.html**
http://www.cpc.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.doc

The upper-ocean heat anomalies since the last half of 2010 were consistent with La Niña conditions (Figure 2). Oceanic La Niña conditions continued to dissipate leading to neutral conditions that are expected to persist through the boreal summer. The eastern equatorial Pacific heat content anomaly became positive in March and strengthened through May. The average temperature anomaly of the equatorial ocean's top 300 meters east of 180° persisted at about 0.5°C, after becoming positive during the March-April period. Sea temperatures then weakened to near zero during July across the eastern equatorial Pacific. La Niña conditions returned, supported by the strengthening of the below – average subsurface oceanic heat content anomaly, in response to increased upwelling and shoaling of the thermocline across the eastern Pacific Ocean.

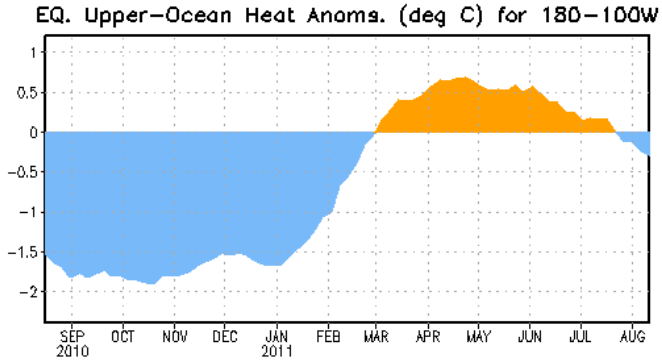


Figure 2. Area-averaged upper-ocean heat content anomalies (°C) in the equatorial Pacific (5°N-5°S, 180°-100°W). Heat content anomalies are computed as departures from the 1982-2004 base period pentad means. In January 2011 negative anomalies began to decrease in magnitude, with positive anomalies evident from March to July 2011. Since late July 2011, temperature anomalies have been negative.

Pacific Decadal Oscillation (PDO) and Sea Surface Temperature at Newport, Oregon:

Source: Jerrold Norton, NOAA (Jerrold.G.Norton@noaa.gov), Bill Peterson, NOAA, NMFS

http://jisao.washington.edu/pdo/, http://www.pfeg.noaa.gov/products/PFEL/modeled/indices/upwelling/NA/data_download.html http://coastwatch.pfel.noaa.gov/cgi-bin/elnino.cgi NMFS/SWFSC/ERD monthly coastal upwelling index, http://jisao.washington.edu/pdo/PDO.latest

The Pacific Decadal Oscillation Index (PDO) quantifies a longer-duration El Niño-like pattern of Pacific climate variability. The PDO is based on sea surface temperature (SST) measurements north of 10°N. A negative PDO event that began in June 2010 appeared to weaken through March, April and May 2011. However, the June Index value reversed the trend and the July 2011 value was strongly negative. The July Index value of -1.86 was the lowest value in 15 consecutive negative values and the lowest value since January 2000. This strongly anomalous value in July is atypical for the annual cycle. In the last thirty years, there has not been a comparable July value, except in July 2008 when the index was -1.67. The timing of the strongly negative July PDO value corresponds to a resurgence of the tropical La Niña conditions and cooling across the eastern equatorial Pacific. Extreme positive SST anomalies, exceeding 3°C, in the north central and western Pacific and the negative SST anomaly near the coast of North America south of 30°N contribute strongly to the negative index value. The PDO is expected to remain negative through early 2012.

Only nine of the last 50 months have had positive PDO Index values. One of the biological signals related to this climate tendency is the fair to good salmon and steelhead escapement to streams on the west coast of North America.

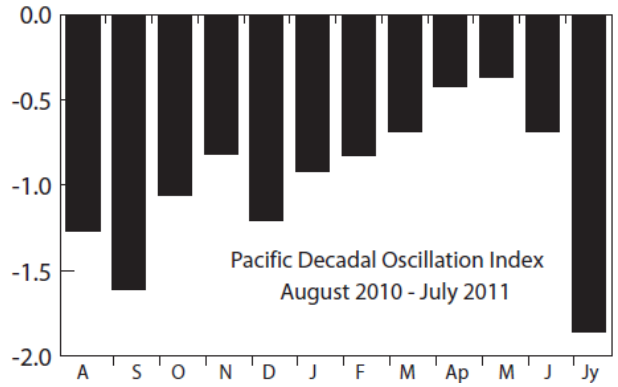
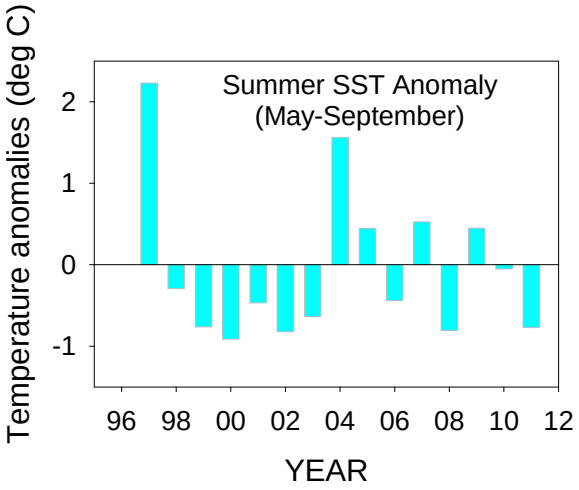


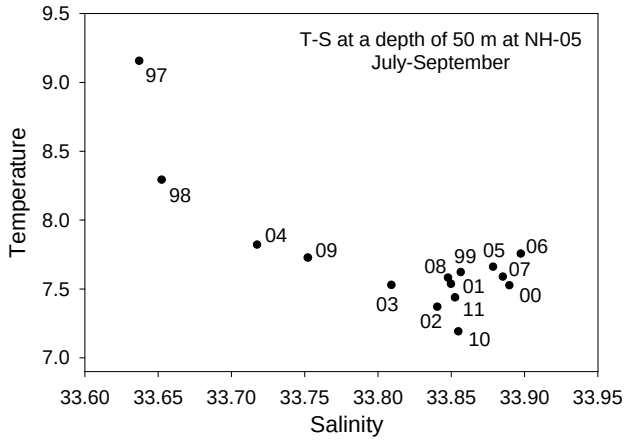
Figure 3. The graph shows monthly values for the Pacific Decadal Oscillation (PDO) Index for August 2010 through July 2011. The PDO remained negative in August at -1.74. With the advent of a La Niña event late last spring, the PDO has been in negative (cold) phase since June 2010 and has remained so through July 2011.

Sea surface temperatures measured at the NOAA Buoy 46050, 22 miles west of Newport, Oregon: Sea surface temperature anomalies at station NH 05 (five miles from shore off Newport) show that upwelling was strong during the summer of 2011. Negative SST anomalies were of similar magnitude to those observed in 2000, 2002 and 2008, on the order of 1°C below normal (Figure 4).



Deep waters at station NH 05 were cold and salty during 2011, another indicator of relatively strong upwelling, and resembled conditions seen in 1999, 2001, 2002 and 2008 (Figure 5). Deep water was as salty in 2010 as in 2011 but colder by about 0.3°C. The years that were relatively warm and fresh included the large El Niño of 1997-1998 and the recent moderate El Niño of 2009.

Figure 4. SST anomalies in May – September of 1997-2011 at a station five miles off Newport (NH 05) Oregon.



Thus, taken as a whole, upwelling was relatively strong during the summer of 2011. However last year, shelf waters off Oregon were influenced by a moderately strong El Niño, production in shelf waters may not have been very high this year. Given that a La Niña event is developing at the equator and the fact that event will follow a year (2011) and high survival of juvenile salmon that out-migrate in spring 2012.

Figure 5. Temperature and salinity in July-September 2011 (labeled '11') measured at a depth of 50 m at a station five miles off Newport (NH 05).

Trinidad Head Line (41° 03.5' N):

Source: Eric Bjorkstedt (NOAA, NMFS, Humboldt State University), Jeff Abell and Phil White (Humboldt State University)

Recent observations along the Trinidad Head Line in Northern California show evidence of variable upwelling through the spring and summer months of 2011 in the form of pulses of cool, salty water on the shelf and corresponding phytoplankton blooms (Figure 6). Despite greater temporal coverage, recent data do not include signatures of upwelling as intense as has been observed in previous years.

The assistance of the Captain and crew of HSU's R/V Coral Sea, and the efforts of the scientific crew—especially Kathryn Crane, Caymin Ackerman, Jose Montoya, and Phil White—in collecting the most recent data is gratefully acknowledged.

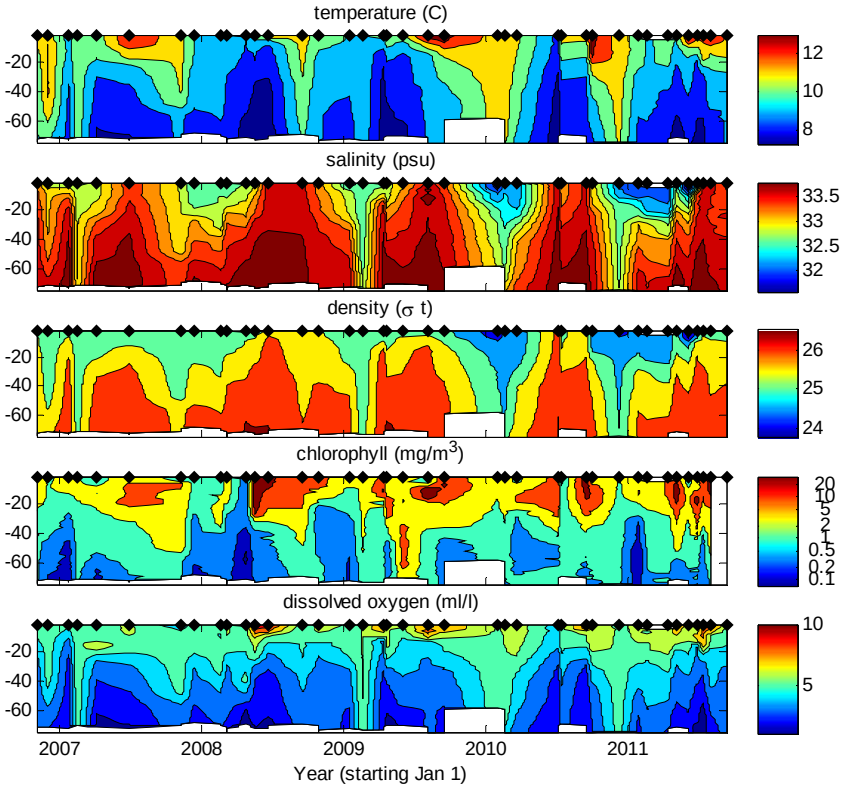


Figure 6. Hovmoller plots (time by depth) of temperature (C), salinity (psu), fluorescence (mg/m^3), and dissolved oxygen (ml/l) at station TH02 (41° 03.5' N, 124° 16' W, approximately 7 nm offshore, 75m depth at mid-shelf) along the Trinidad Head Line. Small symbols along top of each plot indicate timing of each cruise. Interpolations between widely spaced points should be interpreted with greater caution.

Upwelling Index:

Source: El Niño Watch, Advisory **http://coastwatch.pfel.noaa.gov/cgi-bin/elnino.cgi,** NMFS/SWFSC/ERD monthly coastal upwelling indices

June coastal upwelling indices (UI) were low with three distinct upwelling episodes at 45°N. Diurnal patterns appeared in mainly positive UIs at 33° and 36°N. The indices were moderately positive at 27°N during June.

Coastal upwelling indices in July were similar in intensity to those in June, but the locations of maximum intensity moved north. Strongly positive UI and positive UI anomalies occurred from 24° to 42°N. North of 45°N, UIs were near zero.

Upwelling indices in August showed diurnal patterns at 36°N and to the south. The indices at 36°N were moderate to high through August. Larger indices, indicating increased coastal upwelling, were computed for 39°N. A negative UI episode was recorded during 21-22 August at 45°N that was not seen at the more southern locations. UI computed from monthly mean pressure fields showed positive UI anomaly between 27°N and 45°N, indicating stronger than average August Coastal upwelling indices.

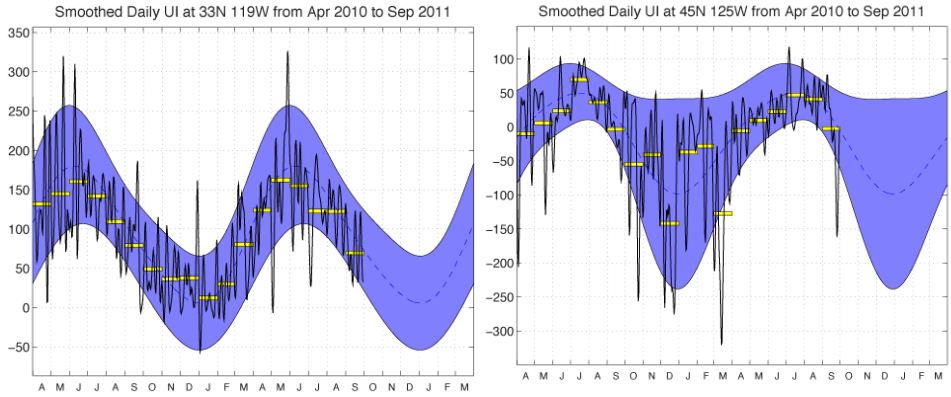


Figure 7. Left panel is recent 18 month record of upwelling for 33°N 119°W. Right panel is same for 45°N 125°W. Positive values are upwelling; negative values are downwelling. Dashed line is the climatological mean. Yellow bars are the means for each month during the period shown.

Regional Oceanic Conditions:

Source: El Niño Watch, Advisory **http://coastwatch.pfel.noaa.gov/cgi-bin/elnino.cgi**

In June 2011 the monthly mean sea surface temperature (SST) patterns of negative SST anomalies that have developed the beginning of 2011 off the west coast became more pronounced with increasingly negative anomalies. However, SST was about average along a 200 – 300 km coastal band between 36°N and 55°N. In areas 500 – 1500 km offshore, anomalies decreased to -2.5°C between 35° to 45°N. Isotherms north of 35°N continued their seasonal northward migration as the 12°C isotherm moved from 40°N to 42°N at 135°W and from 41°N to 49°N at 125°N.

In July 2011, monthly mean SST anomalies increased east of 145°W. Offshore areas of negative SST anomalies, which have persisted since March, came closer to the monthly mean. Positive anomalies, to 1.5°C, developed within a coastal band, 200-300 km wide, from 32°N to 50°N. The 16° and 17°C isotherms replaced the 15° and 16° isotherms, respectively, off Southern California. A well developed coastal upwelling system, with cooling effects reaching 400 km offshore, was shown by the 14° and 15°C isotherms which were parallel to the coast between 35° and 44°N.

In August, monthly mean SSTs were 16° to 17°C off the northern Oregon coast. Positive SST anomaly to 2°C was found along the coast and up to 300 km offshore from southern Oregon (42°N) to Vancouver Island (52°N). Overall there was warming east of 135°W and also increases in SST anomaly.

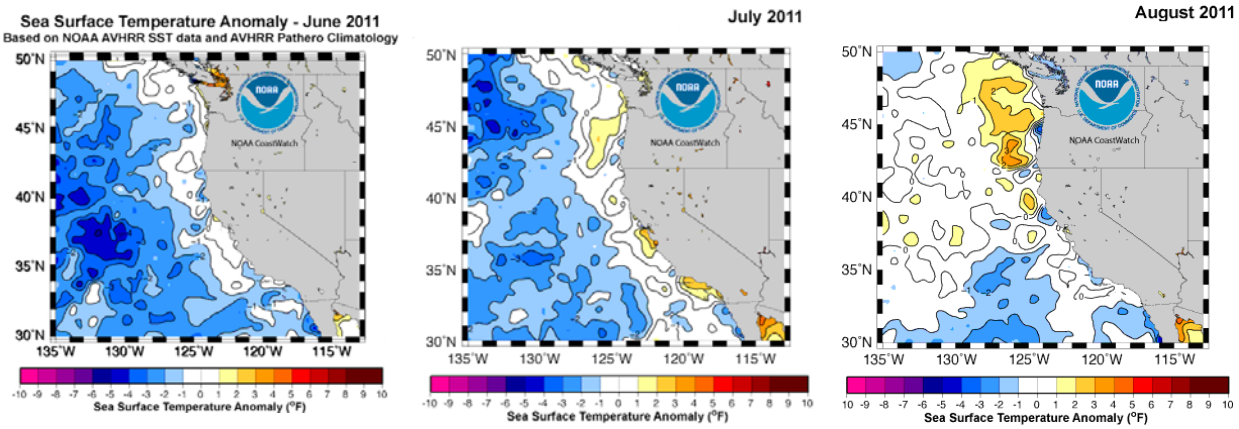


Figure 8. Regional oceanic conditions in the California Current Region (June through August).

Madden Julian Oscillation (MJO):

Source: **http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/mjo.shtml** ***(Expert Discussions)***
http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/ARCHIVE/ ***(summaries)***

The MJO is an intraseasonal fluctuation or "wave" occurring in the global tropics with a cycle on the order of 30-60 days. The MJO has wide ranging impacts on the patterns of tropical and extratropical precipitation, atmospheric circulation, and surface temperature around the global tropics and subtropics. The MJO does not cause El Niño or La Niña, but can contribute to the speed of development and intensity of El Niño and La Niña episodes. The MJO index did not indicate significant MJO activity all of June and through early August 2011. Westerly 850-hPa vector wind anomalies persisted across the eastern Pacific Ocean early-to-mid June with a slight increase in intensity late June. Westerly anomalies persisted across the eastern Pacific Ocean early July. Mid-July, the MJO index indicated fast eastward propagation associated with other subseasonal coherent tropical variability. Late July, westerly anomalies shifted northward and weakened. Early to mid-August, westerly anomalies continued and strengthened across the Pacific. Late August, the MJO index increased in amplitude with eastward propagation.

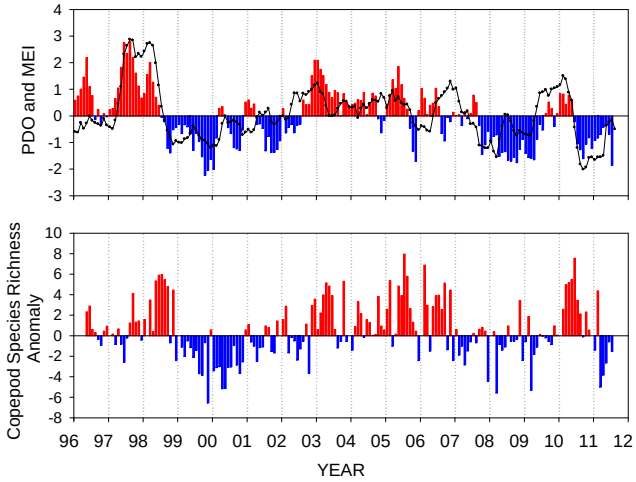
ECOSYSTEMS

California Current Ecosystem Indicators:

<u>Copepod Species Richness</u>:

Source: Bill Peterson, NOAA, NMFS

Species richness is simply a measure of the number of copepod species in a plankton sample. Below is shown the time series of monthly averaged species richness from samples collected at station NH 05 (five miles off Newport in 62 m of water). Positive richness anomalies indicate a warm water copepod assemblage; negative richness, a cold water community. The figure below shows the species richness anomaly time series (lower panel) and the PDO and MEI time series (upper panel). The PDO is the Pacific Decadal Oscillation; the MEI the multivariate ENSO Index. The former is linked to SST in the North Pacific; the latter to ENSO activity at the equator.



It is clear in the figure that the PDO and MEI track each other. Also, changes in copepod species richness also tracks the PDO and MEI but with a time lag of a few months. The year 2011 has had negative richness anomalies since February, another good sign that ocean conditions have become favorable for juvenile salmon and other marine life.

Figure 9. Upper panel: Time series of the PDO (1996-2011) showing that cold ocean conditions have persisted through summer and fall of 2010 and into the winter and spring of 2010-2011.
Lower panel: Time series of the copepod species richness, taken from Newport Hydrographic (NH) line, Oregon.

<u>Copepod Abundance and Biomass off Newport</u>: Unfortunately we have fallen behind on analysis of data from the Newport Line and cannot report on quantitative differences in copepod abundance or biomass among years. However it is clear the biomass has been moderately high this year (but not extraordinarily high) suggesting that we are still feeling the impact of last year's El Niño event.

Coastal Pelagics:

Market Squid:

Source: El Niño Watch, Advisory http://coastwatch.pfel.noaa.gov/cgi-bin/elnino.cgi

California landings of market squid in May totaled about 4,000 metric tons (mt). Productive commercial fishing continued through June. Most of the catch came from southern Monterey Bay. Average ex-vessel price was $550/mt.

Pacific Sardine and Pacific Mackerel:

Source: El Niño Watch, Advisory http://coastwatch.pfel.noaa.gov/cgi-bin/elnino.cgi

Both Monterey and southern California Pacific sardine and Pacific Mackerel landings decreased from January to March and increased from June to July (Figure 10). Commercial sardine fisheries opened for the second annual allocation on July first. California, Oregon and Washington each had about 6 – 8 thousand mt landed and the allocation was filled by July 12.

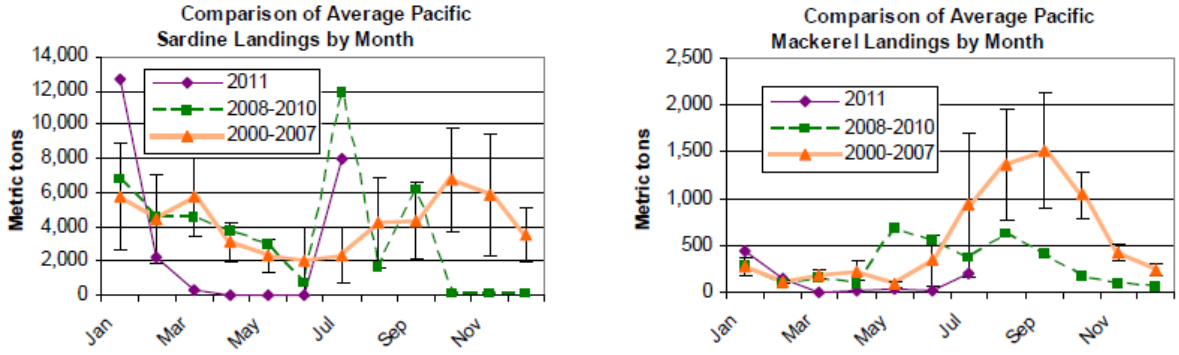


Figure 10. These graphs compare monthly Pacific sardine and Pacific mackerel landings during the last 12 years.

California statewide monthly length averages of port sampled Pacific sardine and Pacific mackerel recorded since 2005 are shown below (Figure 11). Average weight and standard length for Monterey Pacific sardine was 83.8 g (+/- 10.12 sd) and 175 mm (+/- 7.0 sd) respectively, and 56.2 g (+/- 8.62) and 160 mm (+/- 8.0 sd) for Southern California Pacific sardine. Southern California Pacific Mackerel weight and standard length averages were 141.2 g (+/- 36.65 sd) and 225 mm (+/- 27.1 sd).

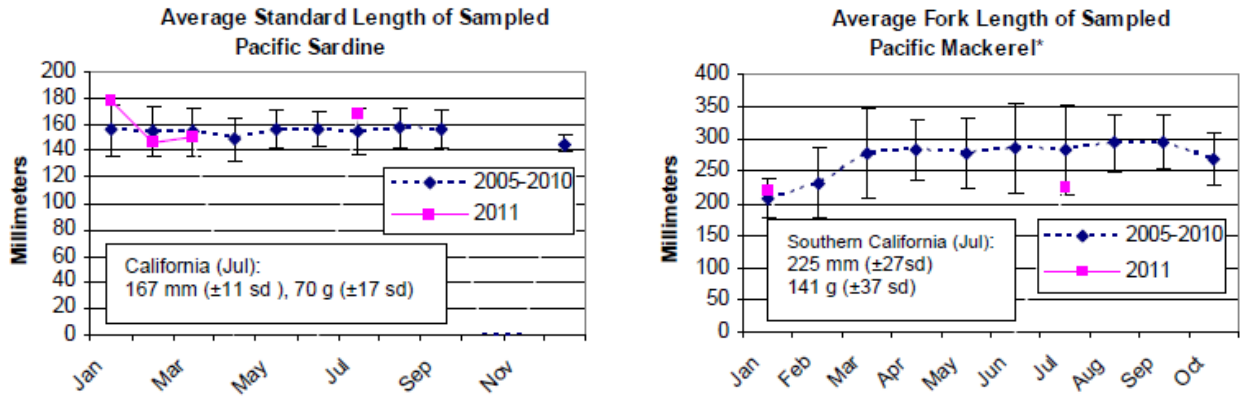


Figure 11. Averaged standard lengths of port sampled Pacific sardine and Pacific mackerel for 2011 and the preceding 6 years. Standard deviation (sd).

Salmon:

Source: Jerrold Norton, NOAA (Jerrold.G.Norton@noaa.gov)

During the central California recreational ocean Chinook fishing season 2 to 10 fish less than 24 inches in length (61 cm), the legal limit, were landed for every fish caught that was over 61 cm. There is considerable speculation whether these smaller fish were mature fish that would escape to Sacramento River in fall 2011 to spawn or whether they were fish that would enter the rivers in 2012. Some of the fish in the 62 cm range appeared to have maturing gonads, suggesting that some of the "short" salmon were maturing. Excessive "short" salmon in the recreational fishery was also encountered in northern California. In August, ocean recreational fishing became more productive in San Francisco Bay area as the migrating fall – run Chinook schooled off Bodega Bay and Point Reyes, preparing to enter San Francisco Bay. There are reports of a larger proportion of salmon over 10 kilograms in the recreational catch outside San Francisco Bay. Migration is with the tide and recreational angling in San Francisco Bay was good as the mature salmon headed for the Sacramento River and its tributaries. By September, fall – run Chinook were throughout the accessible areas of the Sacramento Basin. The run appears better than the 2010 fall – run, but the 2010 fall – run was weak even though most fishing was suspended. The Sacramento spring Chinook runs, that are generally completed in July, are monitored at Butte Creek which joins the Sacramento River near 39°N, 122°W. The spring – run was less than expected, considering the good river conditions brought by the stormy winter. Butte Creek surveys led to an estimate of 2,130 spawners. This is the third consecutive year of estimates of about 2,000 spawners. Previous lows for Butte Creek were about 5,000 salmon in 2003, 2006 and 2007. Many of the 2010 run's progeny have remained in the creek.

Recreational and Tribal Commercial fishing for fall – run Chinook has been good on the lower Klamath River, with prospects of meeting the regulated quota relatively early in the season. The Trinity River joins the Klamath River about 32 kilometers from the ocean. Spring – run Chinook salmon returns to the Trinity were as much as 160% of 34 – year averages. In river surveys of the major Trinity tributaries found steelhead at about 180% of the 34 – year average. Streams all along the Oregon coast received salmon, steelhead and sea – run cutthroat trout from the ocean. Presently Chinook are found in accessible areas throughout the Rogue River drainage.

By the end of August, over 700,000 adult salmon and steelhead had been counted at the Bonneville Dam fishway, 250 kilometers up the Columbia River. By mid-September the season's cumulative total had increased to 1.2 million, with fall – Chinook, coho and stealhead runs contribution to the increase. On the Columbia, spring and summer Chinook runs started 10 – 20 days later than in 2010. At the run's end, the spring and summer runs together were about average and about 80% of the 2010 run. The fall Chinook salmon run brought about 200,000 additional fish across the Bonneville fishway, but by mid – September, the fall run remained about 90% of the ten – year average and 86% of the 2010 run. The coho salmon run was extremely strong in early September and by mid – September the 2011 this run has been about 90% of the average and the 2010 runs. The sockeye run of 186,000 salmon, that ended in July on the lower Columbia was 150% of average and 88% of 2010. The sockeye run in Frazer River, which reaches the ocean about 500 kilometers north of the Columbia River mouth, had a 2010 and 2011 sockeye pattern that was similar to the pattern seen on the Columbia. The 2011 Frazer River run was estimated to be about 2.4 million sockeye.

Salmon:

Source: Bill Peterson, NOAA, NMFS

The relative abundance of juvenile salmon off the coasts of Washington and northern Oregon is assessed by trawl surveys carried out in each year since 1998 for a total of 14 surveys. Samples are collected at 5-7 stations along each of 8 transects, ranging from Newport OR north to La Push WA. Catches of juvenile salmonids in 2011 were mediocre (below average) for all life history types – catches of yearling Chinook (a.k.a. spring Chinook) ranked 9 of 14, yearling coho ranked 10 of 14, chum salmon 10 of 14. Slightly higher catches were made for sub-yearling Chinook (fall Chinook), 6 of 14 and of sockeye, 7 of 14. The preponderance of low values suggests that ocean conditions during the spring of 2011 were far from optimal.

Groundfish:

Source: Pacific Fisheries Management Council (http://www.pcouncil.org/)

Stock Assessments for 2013-2014 (Decisions of the PFMC, June 8-13, 2011): The Council adopted new assessments for Pacific ocean perch, petrale sole, spiny dogfish, sablefish, Dover sole, greenspotted rockfish, and blackgill rockfish for management decision-making as recommended by the Scientific and Statistical Committee (SSC). A new widow rockfish assessment was scheduled for further review by the SSC Groundfish Subcommittee at the September "mop-up" panel. The Council will consider adopting the assessments to be reviewed at the "mop-up" panel in November.

Highly Migratory Species:

Source: Pacific Fisheries Management Council (http://www.pcouncil.org/)

Swordfish Management Workshop Report: The Council directed the Highly Migratory Species (HMS) Management Team and advisory Subpanel to provide information to inform a decision on whether to change the current west coast swordfish fishery, tentatively scheduled for the March 2012 Council meeting. This information would include: (1) All relevant new information on bycatch mitigation in swordfish fisheries, including the amount and reasons for changes in bycatch in the Hawaii based longline fishery since 2000, and information about new gears, such as the buoy-based gear used in Florida area fisheries; (2) Current research on the distribution of sea turtles and their critical habitat off the west coast and its relevance to potential fishery management changes, including a change to the configuration of the Pacific Leatherback Conservation Area (PLCA); and (3) Based on the information in 1 and 2 above, comparisons of protected species bycatch estimates between current, status quo west coast swordfish fisheries, the gear types described above, fisheries in place at the time of HMS FMP adoption and possible future fishery designs.

Recommendations to International Fisheries Organizations: The Council made a variety of specific recommendations to U.S. delegations to the 82nd Inter-American Tropical Tuna Commission meeting (July 4-8) and the 7th Western and Central Pacific Fish Commission Northern Committee meeting (September 6-9) relative to potential conservation measures for North Pacific albacore, Pacific bluefin tuna, tropical tunas (bigeye, yellowfin and skipjack), and other monitoring, control, and surveillance (MCS) measures. For use at some point after the remaining regional fishery management organizations (RFMO) meetings in 2011, the Council tasked the Highly Migratory Species (HMS) Management Team and HMS Advisory Subpanel with beginning development of a proactive management framework for North Pacific albacore, towards a purpose of being proposed at the international level through U.S. delegations. This effort will begin after the 2011 albacore stock assessment is formally released later this year.

Harmful Algal Blooms:

This section provides a summary of two toxin-producing phytoplankton species *Pseudo-nitzschia* and *Alexandrium* activity. *Alexandrium* is the dinoflagellate that produces a toxin called paralytic shellfish poisoning (PSP), and *Pseudo-nitzschia* is the diatom that produces domoic acid.

Washington HAB Summary (through August)

Source: http://ww4.doh.wa.gov/gis/mogifs/biotoxin.htm

Washington's Olympic Region Harmful Algal Bloom (ORHAB) partnership monitors nine regular sites along Washington's outer coast for the presence of harmful phytoplankton species weekly. Please view the http://ww4.doh.wa.gov/gis/mogifs/biotoxin.htm site for the most current status.

Oregon HAB Summary (through August)

***Source: Oregon Department of Fish and Wildlife* http://www.dfw.state.or.us/MRP/shellfish/**

Source: Zach Forster, Oregon Department of Fish and Wildlife

Monitoring for Oregon's Coastal Harmful Algae (MOCHA) project monitors ten nearshore sites for the presence of harmful algae for *Pseudo-nitzschia* and *Alexandrium*. Phytoplankton samples are collected weekly.

Alexandrium was first observed in net tow samples along the northern Oregon coast at the beginning of June. Epip-flouresence microscopy confirmed the presence of multiple species of *Alexandrium* in samples collected from Clatsop and Cannon beaches. As favorable conditions persisted through much of June *Alexandrium* cells were observed in 10x concentrated whole water samples from the Columbia River to as far south as Newport. On July 1, 2011, the Oregon Department of Agriculture reported toxin concentrations in mussels exceeded regulatory closure levels and subsequently the fishery from the Columbia River south to Cape Mears was closed.

Pseudo-nitzschia observations included a coast wide increase of the smaller (*P. delicatissima/pseudodelicatissima*) cell type with cell counts peaking along the south coast in late July. A second bloom of the larger (*P. australis./fraudulenta*) cell type was observed in August with cell counts continuing to increase through September along the north coast. No new accumulations of domoic acid were associated with either event.

Sampling in August and September captured other potentially harmful algae including *Dinophysis spp.*, *Akashiwo sanguinea* and *Cochlodinium polykrikoides*.

California HAB Summary (through August)

Source: Gregg W. Langlois, CA Department of Public Health

http://www.cdph.ca.gov/healthinfo/environhealth/water/Pages/Shellfish.aspx

Shellfish samples are collected at different sites along the coast of California. Some stations are sampled on at least a weekly basis.

Alexandrium was absent from most sampling locations from June to August. PSP toxins were not detected in shellfish samples collected throughout the entire coast of California in June. July 20, a low level of the PSP toxins was detected in mussels collected from Portuguese Bend in the Palos Verdes region. In August, low levels of PSP toxins were detected in shellfish samples from sites in Del Norte, Santa Cruz, and Monterey counties.

Throughout June and July, *Pseudo-nitzschia* was observed along the entire southern California coast and at several sites along the northern California coast. During the second week of June, offshore of Santa Barbara the toxin concentration in shellfish had exceeded the federal alert level. Domoic acid levels at this site increased throughout the month, reaching 84 ppm by June 24. The high levels of domoic acid detected during June decreased below the detection limit by the first week of July. This decline was temporary, as the toxin level increased during the second week and exceeded the alert level the last two weeks of July. Domoic acid was not detected in any samples analyzed in northern California throughout the months of June and July. In August domoic acid alert levels were detected inside Morro Bay during the first two weeks of the month. Domoic acid increased from nondetectable to above the alert level in sentinel mussels from the Santa Cruz Pier between August 3 and 10. A low level of domoic acid was also detected in mussels from Monterey during the last week of the month.

Dissolved Oxygen Concentration:

Source: Bill Peterson, NOAA, NMFS

Oxygen concentrations in deep water at station NH -05 off Newport fell below the threshold of 1.4 ml L^{-1} on multiple occasions during 2011. In fact, 7 of 10 sampling dates fell at or below this threshold. Furthermore, the lowest oxygen concentration measurements of the six year time series were recorded in 2011, on 1 and 13 September. These values are lower than any recorded by us in 2006, a year of a major fish kill, thus if low oxygen concentrations persist for many more weeks, it is likely that another fish kill will occur soon.

Low oxygen concentrations are thought to be related to upwelling strength however it is clear that this is only part of the story as 2006 was a year with well above average whereas 2011 was a year of “average” upwelling (Figure 12 & 13), yet oxygen concentrations in 2011 were the lowest that we have seen our six years of measurements.

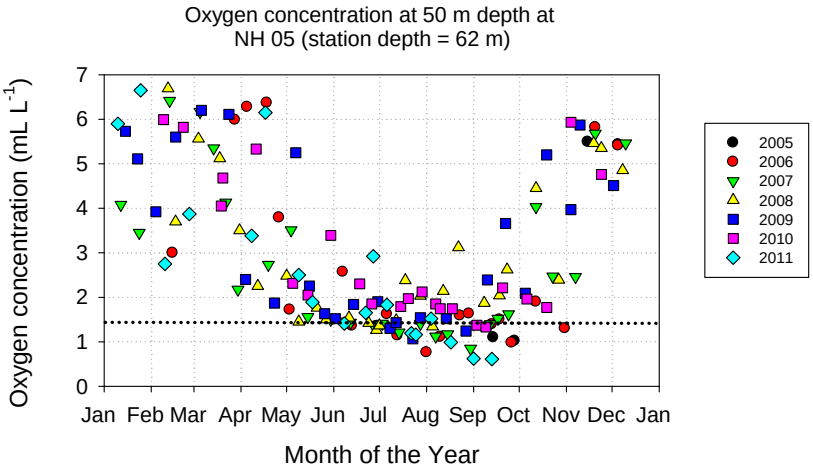


Figure 12. Oxygen concentrations at station NH-05 (five miles off Newport, OR), at a depth of 50 m. Station depth is 60 m.

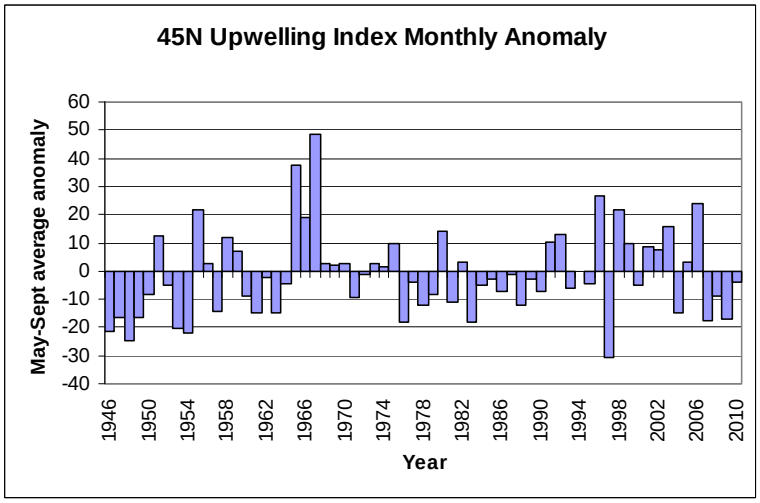


Figure 13. Upwelling index at 45°N.