

**White Seabass FMP Annual Review for 14/15  
Supplemental Information  
Marine Region**

**April 2016**

The declining trends in landings for the past several years, along with the commercial overfishing criteria being triggered last year and for the current 14-15 season, have prompted the Department to investigate other datasets to help explain these trends. The Department has looked into changes in effort, gill net survey data, and oceanographic conditions which are summarized below. Although not required for the annual review of the white seabass fishery management plan (WSFMP), the Department considers that analyses of these additional datasets can better describe and enhance our knowledge regarding the status of the fishery beyond what is gleaned from the amount of landings and weights of harvested fish.

**Effort**

The WSFMP requires the calculation of percent changes in harvested fish (numbers and weights) over time to see if an overfished condition exists; however, there is no consideration given to changes in effort. Both recreational and commercial fisheries shift effort for a number of reasons.

To calculate recreational effort, we analyzed Commercial Passenger Fishing Vessel (CPFV) data from logbooks. These data can be evaluated as catch per unit effort (CPUE) by looking at number of white seabass caught per angler. We chose only those trips that are “targeting” white seabass by including trips where at least one white seabass was caught. Although this method is not exact, it does exclude many trips that are targeting other highly desirable pelagic species (such as many tuna species) which are unlikely to catch white seabass.

All CPUE values from CPFVs during the cooler water period (1999-2013) are greater than those during the prior warmer period (1980-1998; Figure 1). Since CPFVs tend to visit the same areas year to year, and are somewhat limited on how far they travel (at least on ½–¾ day trips), these numbers indicate that white seabass have been more abundant in local nearshore and island waters during this past cooler water period. A big drop in CPUE occurred from 2014-2015; this coincided with the return of warmer than average water temperatures.

CPUE from private/rental boats showed an increasing trend from 2004 to a peak in 2010 and 2011, similar to the trend for the CPFVs (Figure 2). CPUE then declined to moderately high levels in 2012, 2013, and 2014; however, just as with CPFVs, the private/rental boat CPUE for white seabass decreased greatly in 2015 with the warmer water.

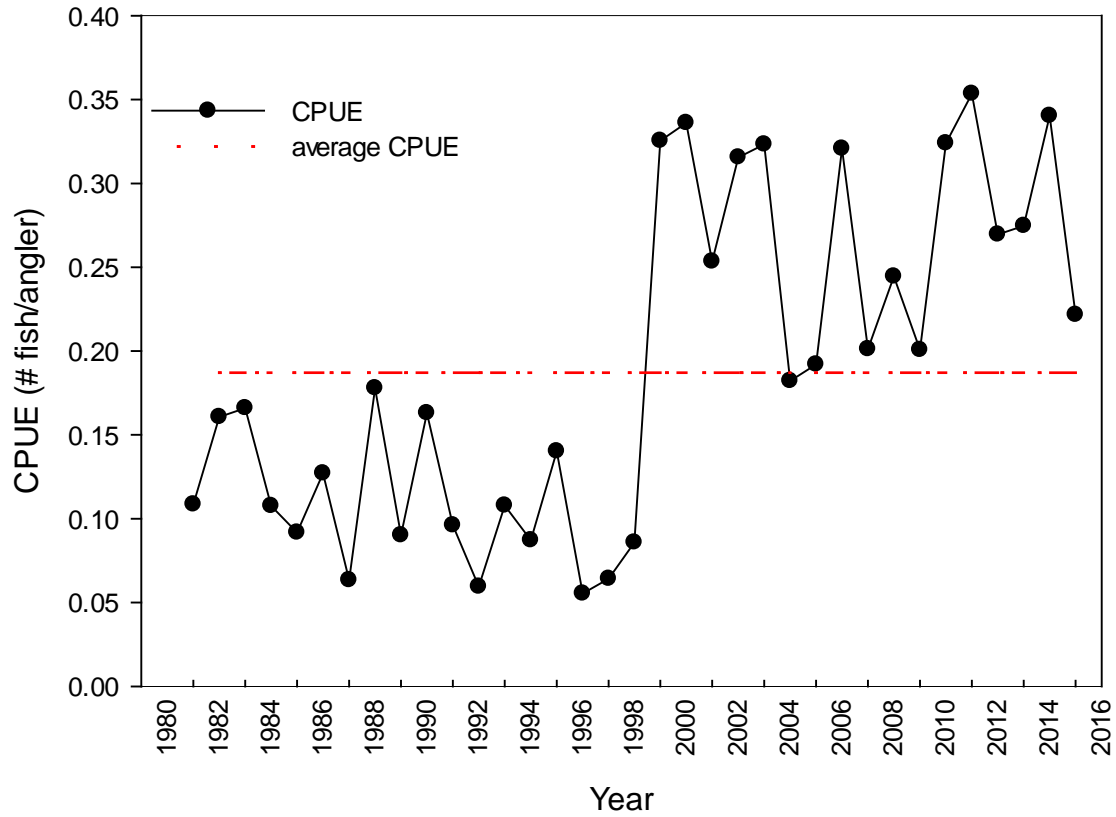


Figure 1. White seabass catch per unit effort (CPUE) from commercial passenger fishing vessels (CPFVs). Data retrieved from the California Department of Fish and Wildlife's Marine Log System (MLS).

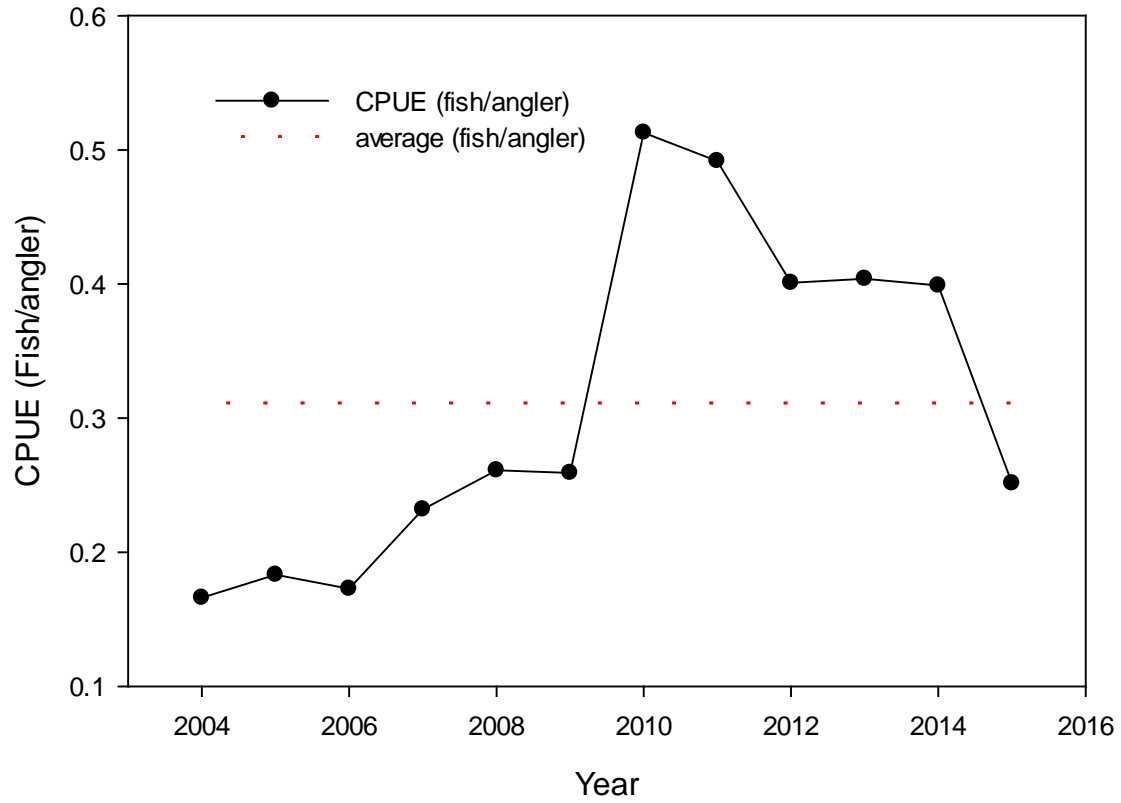


Figure 2. White seabass catch per unit effort (CPUE) for recreational private/rental fishing mode. Data accessed from RecFIN database, March 2016. Includes sampler examined harvested fish.

Commercial fishing effort for white seabass can be calculated in many different ways. There are many different gear types used in the fishery such as gill nets, hook and line, and trawls. In addition, these gear types come in different sizes and are deployed in varying amounts. We have calculated CPUE by dividing the total weight of catch landed (pounds) by the total number of trips that landed white seabass. This is a more accurate estimate of CPUE than dividing the catch by total number of vessels that landed white seabass as the number of trips taken by an individual vessel during the year is extremely variable.

The commercial CPUE was lowest for most of the '80s, increased in the 90s, and was fairly steady during this period (Figure 3). In 2002, CPUE greatly increased, peaking in 2008; however, CPUE dropped sharply in 2009 until 2013 when it started to increase again. Similar to the recreational catch from CPFVs, CPUE was generally higher during the cooler water period (1998-2013) than the warmer water period (1980-1998). Commercial CPUE also increased from 2012-2014, but unlike CPFV CPUE, it continued to increase in 2015.

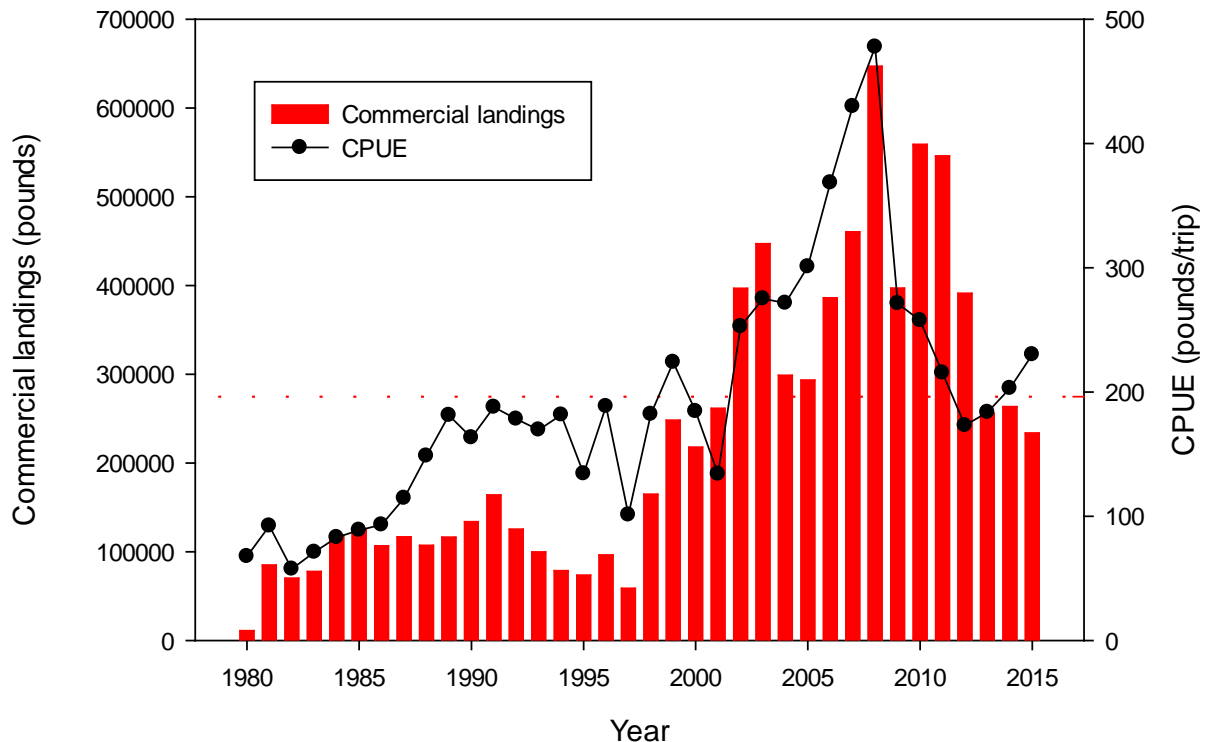


Figure 3. White seabass catch per unit effort (CPUE) from commercial landings. Data retrieved from California Fisheries Information System, March 2016. Dashed line represents the average number of pounds per trip from 1980-2015.

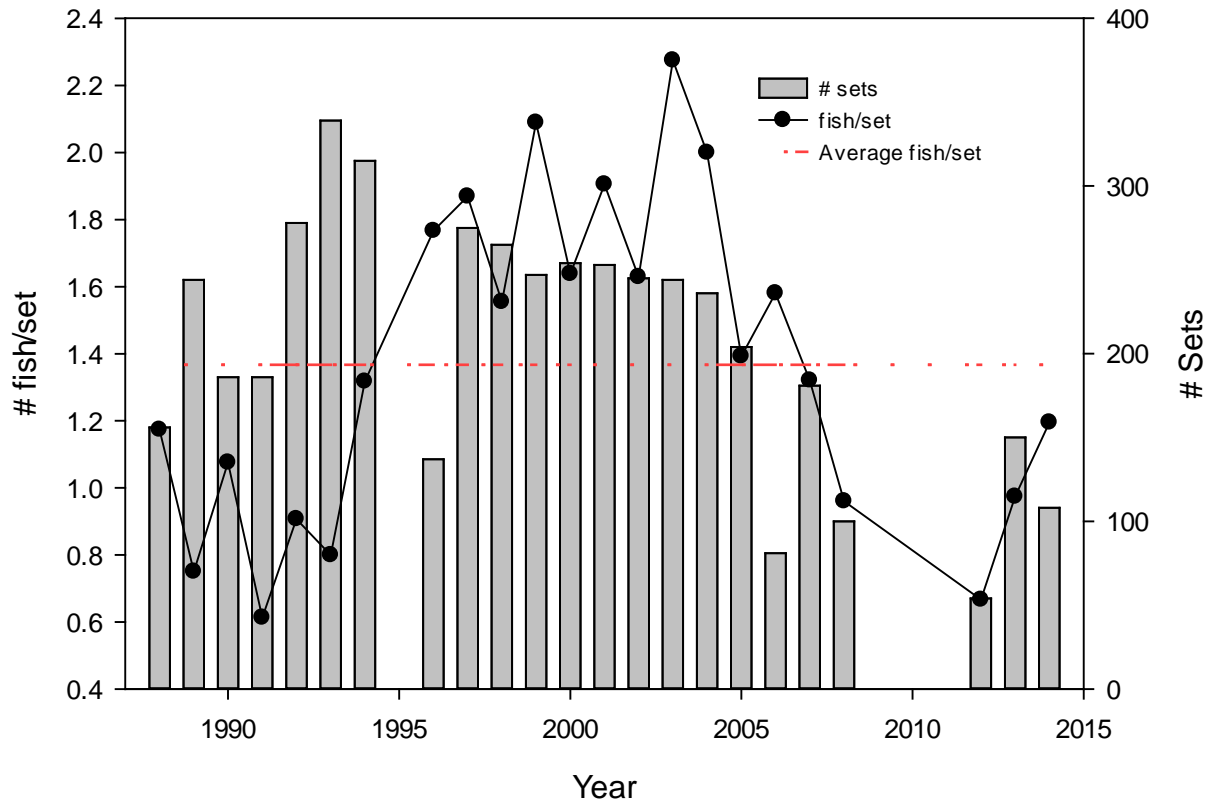


Figure 4. Recruitment data from white seabass gillnet surveys collected by Hubbs-Sea World Research Institute (HSWRI), California State University Northridge (CSUN) and San Diego State University (SDSU).

**Recruitment Indices**

The WSFMP requires an analysis of the best available data to determine if recruitment of juvenile white seabass declined by 30% or greater from the prior five-year average. These data are collected from gill net surveys; however, due to a lack of funding these surveys were not done from 2009-2011 and this prevents an analysis of this criterion for the 14-15 season. Nevertheless, in general, higher CPUEs occurred during the cooler water period (1999-2013; however, there were lower CPUE values for 2008, and 2012-13). Interestingly, there has been an increase in recruitment for the last two years (Figure 4).

**Oceanographic conditions**

For determining the effects of oceanographic conditions on catches of white seabass, we looked at periods of Pacific Decadal Oscillations (PDOs) since 1936. A PDO is a climate index based upon patterns of variation in sea surface temperature of the North Pacific. PDOs are characterized as “cool” and “warm” phases based upon deviations from average sea surface temperatures, and these phases can persist for decades.

For recreational catch of white seabass, the largest number of fish per year occurred during cooler water periods and the average number of fish caught per year was greatest in both cooler water periods compared to all three warmer water periods (Figure 5). There appears to be no correlation of white seabass catch with strong to very strong El-Niño events (e.g., '57-58, '65-66, '72-73, '82-83, '97-98, and '15-16). Squid, which are a preferred prey of white seabass, are much less abundant during these El-Niño events. Interestingly, white seabass catches are much greater at the beginning of a cool water period and then decline greatly thereafter.

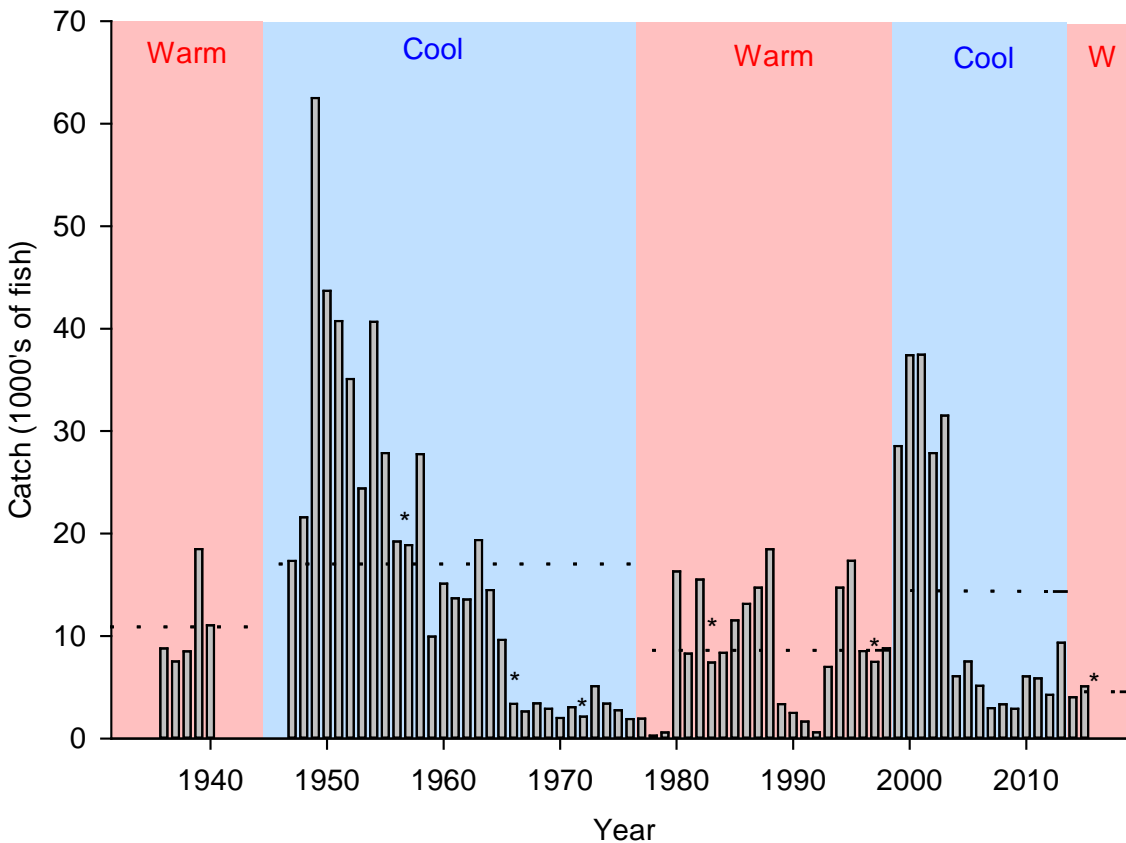


Figure 5. Historical recreational catch of white seabass with Pacific Decadal Oscillation (PDO) trends. Dashed line represents the average number of fish caught/year for that time period. Asterisks denote strong to very strong El-Niño years.

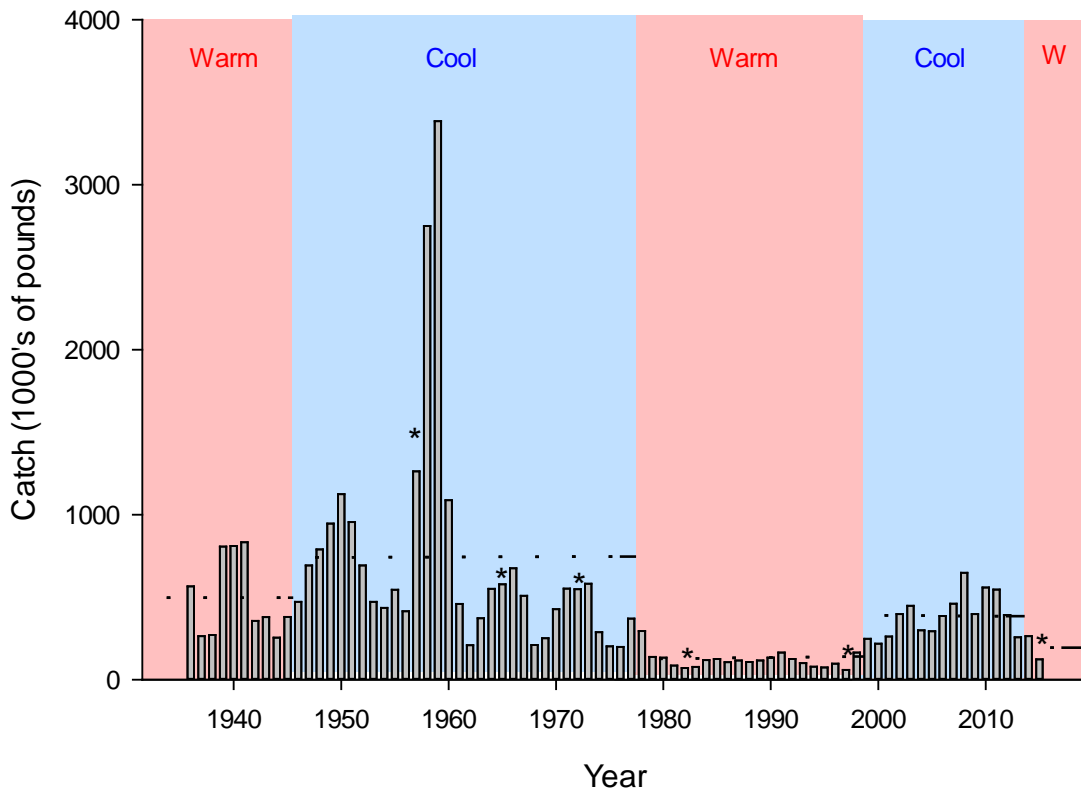


Figure 6. Historical commercial catch of white seabass with Pacific Decadal Oscillation (PDO) trends. Dashed line represents the average number of fish caught/year for that time period. Asterisks denote strong to very strong El-Niño years.

Similarly, commercial catch of white seabass in pounds was greatest during cooler water periods relative to warmer periods; however, the second cooler water period had average yearly landings just slightly lower than during the first warmer water period (Figure 6). Interestingly, every year of landings in the second cooler water period is greater than all but one year during the immediately prior warm water period. Unlike recreational catches, commercially-caught white seabass peak during the middle of the cool water periods.

These graphs support the contention by fishermen that white seabass are hard to find during warmer periods due to their migratory behavior, either looking for squid which is much less available during these conditions, and/or moving up the coast with the warmer water.