

222 NW Davis Street, Suite 200
Portland, OR 97209 USA

+1.503.235.0278
OCEANA.ORG

March 20, 2015

Ms. Dorothy Lowman, Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220

RE: Agenda Item G.1 – Final Action on Sardine Assessment, Specifications and Management Measures for 2015-16

Dear Chair Lowman and Council Members:

The Pacific sardine fishery is in a state of collapse caused in part by overfishing. The preliminary 2015 Pacific sardine assessment¹ indicates that the northern Pacific sardine population has declined approximately 90 percent since 2007, that predicted recruitments have been grossly overestimated, and in fact, recruitment events have been among the weakest in recent history. The sardine population is estimated to be below the 150,000 metric ton CUTOFF and therefore, following the Coastal Pelagic Species (CPS) Harvest Control Rule and Fishery Management Plan, the 2015-16 harvest guideline must be set at zero. What is more, recent exploitation rates have been above maximum sustainable yield exploitation rates and therefore the fishery has been overfishing the sardine population during this crash. Given the information in this preliminary assessment, we are writing to request the Council take the following actions:

1. Set the July 1, 2015 to June 30, 2016 harvest guideline at zero.
2. Take immediate steps to end overfishing, help rebuild the Pacific sardine population, and fix the fundamental flaws in the Pacific sardine harvest control rule that have contributed to the current collapse.
3. Set the incidental sardine bycatch allowance in other CPS fisheries at zero. Any incidental allowance would be fishing in excess of the harvest control rule and it would contradict the rules of the CPS FMP.

Role of the Fishery in the Current Sardine Population Decline

We recognize that the sardine population is greatly affected by environmental factors like ocean temperature and that Pacific sardine naturally experience wide population fluctuations even in the absence of fishing.² Forage fish like sardine, however, are highly vulnerable to overfishing

¹ Hill, K.T., P.R. Crone, D.A. Demer, J. Zwolinski, E. Dorval, and B.J. Macewicz. 2015. Assessment of the Pacific Sardine Resource in 2015 For U.S.A. Management in 2015-16. Preliminary Draft for SSC CPS Subcommittee Review on 6 March 2015.

² Baumgartner et al. 1992. Reconstruction of the History of Pacific Sardine and Northern Anchovy Populations over the Past Two Millennia From Sediments of the Santa Barbara Basin, California. CalCOFI Rep., Vol. 33.

and collapse.³ As clearly shown in the various simulation model runs performed by the Council's Scientific and Statistical Committee⁴, excessive fishing pressure--particularly during periods of low recruitment and/or abundance--can have the dramatic effect of exacerbating natural declines. With excessive fishing pressure, sardine population declines are steeper, drop to lower levels, and fundamentally dampen the future recovery and productivity of the sardine stock in the long-term. As observed after West Coast sardine overfishing in the 1940s and 1950s, the population did not recover to levels once seen before exploitation. Based on current fishing rates during a period of low sardine recruitment, it is clear that U.S. and international fishing pressure have contributed to the current decline, making it far worse than it would have been in the absence of fishing.

This collapse was predicted and managers were warned of excessive exploitation rates. In 2012, NOAA scientists Zwolinski and Demer published a study predicting the collapse of the Pacific sardine stock.⁵ The authors warned:

[a]larming is the repetition of the fishery's response to a declining sardine stock - progressively higher exploitation rates targeting the oldest, largest, and most fecund fish.

According to the draft 2015 assessment, the 1+ stock biomass of the Northern subpopulation of Pacific sardine will have declined by over 900,000 metric tons (mt) between 2007, when it peaked at 1.037 million mt, and July 2015, when it is estimated to be between 132,884 mt and 96,688 mt (the latter is thought to be more likely by the assessment authors). This represents an 87% to 91% decline over the past eight years. Over the same eight year period, the fishery removed 752,403 mt of sardines attributed to the Northern subpopulation (NSP) (draft 2015 Stock Assessment, Table 2 on p. 42, summing NSP catches from 2007 through 2014). Therefore, while we can only speculate what the decline would have been in the absence of fishing, 73% of the recent eight year decline is attributable directly to fishery removals.

Among the contributing factors is that the 2014-15 Harvest Guideline was calculated using an assumption about sardine recruitment that has since proven to be overestimated. Rather than using recent average recruitment that was known at the time to be at historic lows, the Council approved an assessment that included a "phantom year class" based on long-term average recruitment, using data from a period where sardines were highly productive. This inflated the biomass estimate by over 22%, along with a much higher Harvest Guideline. However, this phantom year class never showed up. In fact, the new stock assessment indicates that the July

³ See Pinsky et al. 2011. Unexpected patterns of fisheries collapse in the world's ocean. PNAS: 108(20):8317-8322 and Lenfest Forage Fish Task Force Report: Pikitch et al. 2012. Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs. Lenfest Ocean Program. Washington, DC. 108 pp.

⁴ Hurtado-Ferro & Punt 2014. Revised Analyses Related to Pacific Sardine Harvest Parameters. Agenda Item I.1.b, March 2014 PFMC meeting.

⁵ Zwolinski, J. and D.A. Demer. 2012. A cold oceanographic regime with high exploitation rates in the Northeast Pacific forecasts a collapse of the sardine stock. Proceedings of the National Academy of Sciences (PNAS) 109 (11). 4175-4180. Available at: <http://www.pnas.org/content/early/2012/02/24/1113806109.full.pdf> and PFMC, Agenda Item C.1b8, supplemental public comment. March 2012. http://www.pcouncil.org/wp-content/uploads/C1b_SUP_PC8_SHESTER_MAR2012BB.pdf.

2014 biomass (under which the 2014-15 HG was set by the Council in April 2014) was approximately 150,000 mt, not the 369,506 mt from the 2014 assessment⁶, meaning that there should have been no fishing since July 2014. This combination of scientific and management errors caused by overly optimistic assumptions could not have come at a worse time.

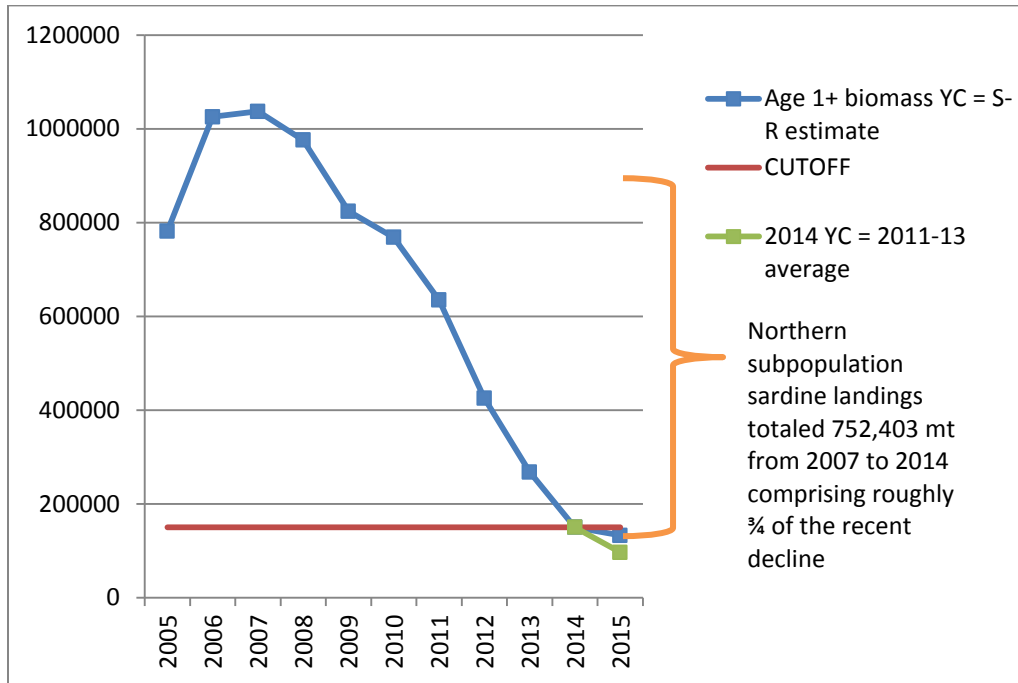


Figure 1. Estimated 1+ sardine biomass (metric tons) from the 2015 preliminary assessment showing CUTOFF and summed sardine northern subpopulation landings from 2007-2014.

After the infamous decline of Pacific sardines following the Cannery Row era, fishery managers learned how vulnerable the sardine stock could be. The mechanisms in the CPS FMP, however, have been insufficient to prevent the same situation from happening again. Both the 1996 Sustainable Fisheries Act and 2006 MSA Reauthorization definitively require an end to overfishing. In 2011, the NOAA Assistant Administrator for Fisheries declared, “At this point, we are turning the corner toward a future when ending overfishing can be a concern of the past, and where maintaining sustainable fisheries is a shared commitment to our future.”⁷

The fundamental premise of a sustainable fishery is to only harvest the surplus production from a stock. There is no surplus production when more fish are dying than recruiting to the fishery. Since for Pacific sardine, there has been zero surplus production over the past eight years, any fishing is overfishing, and overfishing really has been occurring since at least 2007.

The CPS FMP states that, “by definition, overfishing occurs in a fishery whenever fishing occurs over a period of one year or more at a rate that is high enough to jeopardize the capacity of the

⁶ Hill et al 2014. Assessment of the Pacific sardine resource in 2014 for USA management in 2014-15. Agenda Item H.1.b Stock Assessment Report; April 2014.

⁷ NOAA Fisheries. *The Road to End Overfishing: 35 Years of Magnuson Act*. Accessed at, <http://www.nmfs.noaa.gov/stories/2011/20110411roadendoverfishing.htm>

stock to produce MSY [Maximum Sustainable Yield] on a continuing basis if applied in the long term.”^{8,9} In March 2014 the PFMC Scientific Statistical Committee recommended that, “overfishing limits (OFLs) for the northern subpopulation of Pacific sardine be based on an E_{MSY} proxy derived from the relationship between estimated E_{MSY} and the 3-year moving average of the CalCOFI temperature index, restricted to an E_{MSY} range of 0-25 percent ...”¹⁰ Prior to this (as per Amendment 13 to the CPS FMP), the overfishing exploitation rate was based on a temperature independent E_{MSY} average value of 0.18.¹¹ E_{MSY} is the expected constant fishing rate that if applied over the long term would result in MSY.

We compared recent U.S. and coastwide exploitation rates presented in the draft 2015 sardine assessment to the constant 18% stochastic E_{MSY} as specified in Amendment 13 to the CPS FMP and the newly adopted CalCOFI temperature-based E_{MSY} as adopted in 2014 by the SSC for determining the OFL. We found that overfishing has been occurring in recent years at the both the U.S. and international levels under both the previous and new scientific understanding of the MSY rate (Figures 2 and 3).

It is important to remember that this is not the total annual mortality. A major portion of the population dies every year due to natural predation. When the fishery and predators both remove significant amounts of the population there is a greater potential for collapse, especially during periods of low natural productivity like we are seeing now. This is a major reason why the Lenfest Forage Fish Task Force recommends fishing rates not exceed 50% of the level that achieves MSY (50% F_{msy} or E_{msy}).¹²

⁸ Pacific Fishery Management Council. 2011. Coastal Pelagic Species Fishery Management Plan as amended through Amendment 13, at page 36. www.pcouncil.org

⁹ Similarly, National Standard One guidelines state, “Overfishing (to overfish) occurs whenever a stock or stock complex is subjected to a level of fishing mortality or annual total catch that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis.” 74 Fed.Reg. 3178, 3206 (January 16, 2009)

¹⁰ Pacific Fishery Management Council. I1c Supplemental SSC statement, March 2014. http://www.pcouncil.org/wp-content/uploads/I1c_SUP_SSC_MARCH2014BB.pdf

¹¹ Pacific Fishery Management Council. 2014. Status of the Pacific Coast Coastal Pelagic Species and Recommended Acceptable Biological Catch. Stock Assessment and Fishery Evaluation 2014, at 42. www.pcouncil.org

¹² Pikitch, E., Boersma, P.D., Boyd, I.L., Conover, D.O., Cury, P., Essington, T., Heppell, S.S., Houde, E.D., Mangel, M., Pauly, D., Plagányi, É., Sainsbury, K., and Steneck, R.S. 2012. Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs. Lenfest Ocean Program. Washington, DC. 108 pp.

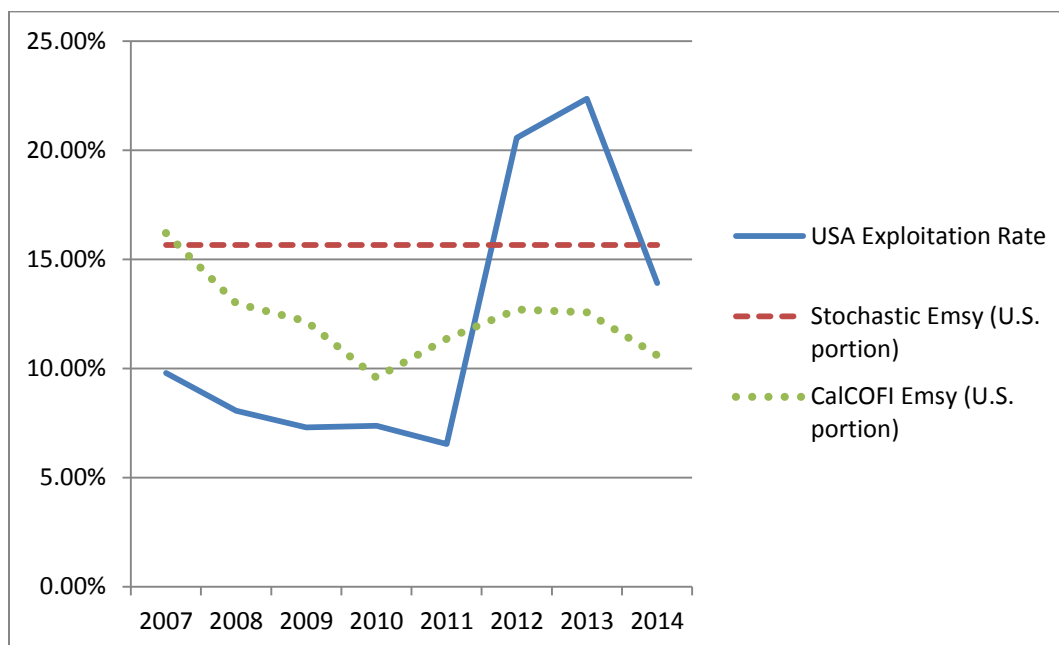


Figure 2. USA exploitation rate compared to the previous stochastic E_{MSY} (as in CPS FMP Amendment 13) and new CalCOFI E_{MSY} rates (as recommend by the SSC) for the U.S. distribution of the stock (87%). Exploitation in excess of E_{MSY} demonstrates U.S. overfishing, occurring since 2012. (Note: U.S. OFL = $BIOMASS * E_{msy} * 0.87$ so U.S. exploitation rates greater than $0.87 * E_{MSY}$ constitute overfishing)

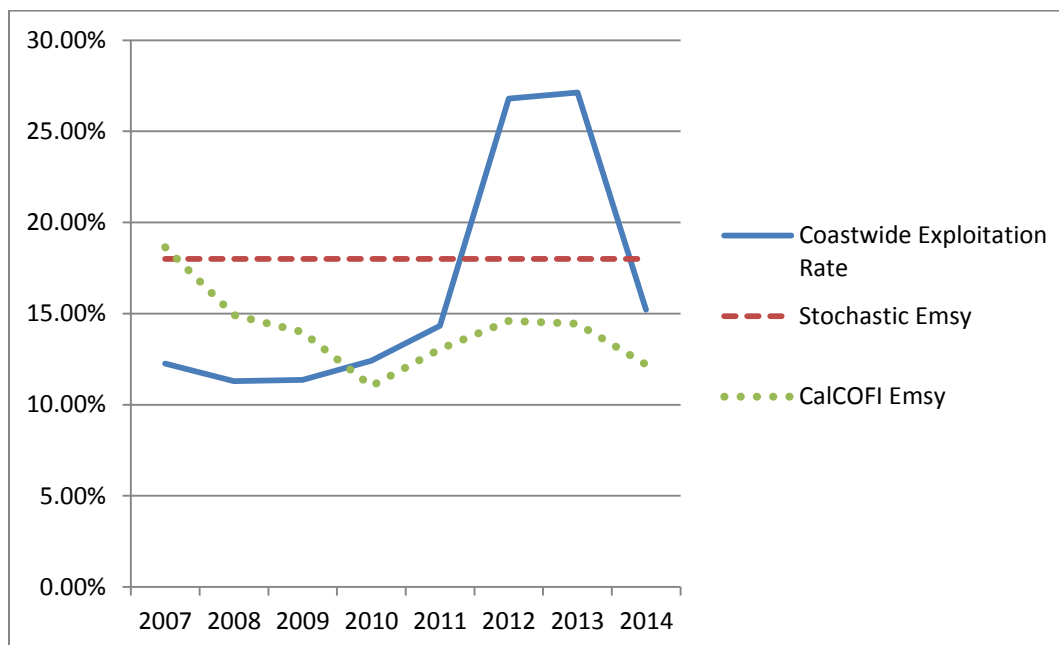


Figure 3. Coastwide (U.S., Mexico and Canada) exploitation rate compared to the previous stochastic E_{MSY} (18% as in CPS FMP Amendment 13) and the new CalCOFI E_{MSY} rates for the coastwide distribution of the Northern sardine population. Exploitation rates in excess of E_{MSY} demonstrates coastwide overfishing, occurring since 2010.

This “retrospective” overfishing is based on information we now know. The fishery did not actually exceed annual overfishing limits established by the Council, but the Council has been using a flawed Harvest Control Rule and stock assessments that have overestimated sardine productivity and failed to account for ecosystem needs. Oceana pointed this out in many comment letters over the years since at least 2008, and we have raised concerns with overfishing since 2011.¹³ In 2012, agency scientists acknowledged excessive fishing pressure on a declining sardine population in a published scientific study that was presented to the Council, but largely ignored.¹⁴ There has been major uncertainty and error resulting in severely over-estimating the sardine population size and MSY fishing levels, and these scientific errors combined with a harvest guideline that is not sufficiently precautionary have resulted in on-the-water overfishing.

This type of situation is not unprecedented. A very similar situation happened during the 1990s when West Coast rockfish were overfished.¹⁵ When it became clear that the rockfish population was severely depleted, the Council and NMFS took actions to rebuild the stocks. That same type of action is now needed for sardines.

Another significant aspect leading to the collapse of the sardine population is that the harvest control rule (HCR) parameters are failing to prevent overfishing, failing to provide sufficient forage to dependent species, and failing to achieve Optimum Yield. The HCR is too aggressive because it allows fishing to continue on the sardine population until it is at approximately 9% of its estimated unfished levels (current CUTOFF is 150,000 tons, approximately 9% of average unfished levels [1.6 million tons] as estimated by the SSC). At this level CUTOFF neither prevents the population from being overfished nor ensures adequate forage for dependent predators. In fact, the first signs of insufficient prey for key indicator predators (e.g., California sea lion Unusual Mortality Event in 2013 and brown pelican reproductive failures since 2011) were seen several years ago when the stock was well above 150,000 tons.

We reiterate our request that the CUTOFF be increased to 640,000 metric tons.¹⁶ Second, the DISTRIBUTION factor has overestimated the proportion of the population in U.S. waters and failed to keep landings below coastwide target fishing rates or overfishing limits, as documented in the stock assessment. Correcting the U.S. DISTRIBUTION value so that the annual total tri-national landings more consistently match the target fishing fraction is essential for the long-term conservation of this fish population. NOAA scientists have recently published a paper that demonstrates alternative methods for accounting for the international distribution of the stock that would permit more U.S. fishing when sardine are predominately located in the U.S. EEZ and

¹³ E.g. http://www.pcouncil.org/wp-content/uploads/I2d_SUP_PC_PPT_OCEANA_NOV2010BB.pdf, http://www.pcouncil.org/wp-content/uploads/G3d_SUP_PC2_NOV2012BB.pdf, and http://www.pcouncil.org/wp-content/uploads/C1b_SUP_PC8_SHESTER_MAR2012BB.pdf

¹⁴ Zwolinski, J. and D.A. Demer. 2012. A cold oceanographic regime with high exploitation rates in the Northeast Pacific forecasts a collapse of the sardine stock. *Proceedings of the National Academy of Sciences (PNAS)* 109 (11). 4175-4180.

¹⁵ Ralston, S. 2002. *The Groundfish Crisis: What Went Wrong. Ecosystem Observations.* Monterey Bay National Marine Sanctuary.

¹⁶ See, G. Shester, Oceana. (February 28, 2014) Letter to the Pacific Fishery Management Council, at http://www.pcouncil.org/wp-content/uploads/I1d_SUP_PC3_MAR2014BB.pdf

appropriately curtail U.S. fishing during periods when a large proportion of the population is present and fished off Mexico, Canada, or both.¹⁷

Effects of low sardine abundance on dependent predators

The current low abundance of sardine concurrent with continued low abundance of Northern anchovy is taking a serious toll on dependent predators in the California Current Ecosystem. An estimated 70% of the California sea lion pups died in 2013 due to starvation and the current estimates of sea lion pup mortality suggest another 70% or more will die this year.¹⁸ Sea lion pups are starving because nursing mothers are spending more time at sea in search of prey and those prey populations – both anchovy and sardine – are at very low levels.

In addition to starving sea lions, California Brown Pelicans breeding in the Channel Islands have undergone a decline in reproductive success since around 2007 culminating in major nesting failures in 2012-2014. Brown Pelican productivity in 2012 was the lowest measured since 1970. Range-wide breeding failure (Gulf of California and Channel Islands) occurred in 2014. Unusual adult Brown Pelican stranding events during the non-breeding season on the California and Oregon coasts were observed in 2009-2010. These unusual events were attributed to a lack of prey availability and fitness.¹⁹

Sardines are an essential prey item for numerous piscivorous seabirds including Brown Pelicans, Elegant Terns, Heerman's Gulls and the federally threatened Marbled Murrelet. Although sardines comprised 25%-67% of the diets of breeding pelicans in six years of surveys that took place at the Channel Islands between 1991-2005, they have been absent from the diets of breeding pelicans in recent years. These examples illustrate that serious ecological impacts of inadequate forage are occurring at sardine abundances much greater than the current CUTOFF in the Pacific sardine harvest control rule. The foraging needs of these predators are not considered in the CPS FMP.

Perhaps one of the greatest risks of continued commercial fishing pressure during the current period of low anchovy and sardine biomass is what is known as the "jellification of marine ecosystems". The northern Benguela current off Namibia (west Africa) -- an eastern boundary current very similar to the California Current -- provides a frightening example of where overfishing small pelagic forage fish (specifically sardines and anchovies) led to a fundamental ecosystem shift from one dominated at mid-trophic level by small pelagic fish to one dominated by jellyfishes.²⁰ Since jellyfish have few natural predators, their outbreaks create a "dead end" in the food web.

¹⁷ David A. Demer & Juan P. Zwolinski. 2014. Optimizing Fishing Quotas to Meet Target Fishing Fractions of an Internationally Exploited Stock of Pacific Sardine, *North American Journal of Fisheries Management*, 34:6, 1119-1130, DOI: 10.1080/02755947.2014.951802

¹⁸ E.g. <http://www.utsandiego.com/news/2015/feb/18/environment-sea-lion-strandings/> and, Melin, S. NOAA Fisheries as in:

<http://www.afsc.noaa.gov/News/Sea%20Lion%20Teleconference%202.18.2015.wav>

¹⁹ Harvey, A.L., and D.M. Mazurkiewicz. 2015. California Brown Pelican and Double-crested Cormorant breeding status on Anacapa Island, California in 2014. Unpublished report, Sutil Conservation Ecology.

²⁰ Roux et al. 2013. Jellyfication of marine ecosystems as a likely consequence of overfishing small pelagic fishes: Lessons from the Benguela. *Bulletin of Marine Science* 89(1):249-284

It is clear from the ongoing starvation of sea birds and marine mammals that sardine management is failing to meet the goal of the CPS FMP to “*provide adequate forage for dependent species.*” which is also an essential part of achieving Optimum Yield. As we have previously stated in letters and testimony, OY is described in the law as MSY as reduced for relevant social, economic *and ecological factors*, and OY is inadequately assessed or specified in the CPS plan as required. We ask the Council to immediately initiate an FMP amendment to address the above described flaws and deficiencies of the CPS FMP.

Incidental Harvest

If the 2015-16 Harvest Guideline is zero, the Council must not allow for incidental sardine harvest in other CPS fisheries. The CPS FMP states, “the total HG will consist of an incidental catch portion and a directed fishery portion”²¹ and “The amount of the HG needed for incidental trip limits when the fishery is nearing closure will vary depending on when the HG is projected to be achieved, but the incidental amount and the amount harvested directly must equal the total HG.”²² It has been the long practice of the Council as articulated in the FMP, to take the incidental allowance out of the overall HG. According to the FMP the Council can set incidental allowances anywhere between 0 to 45 percent of landed weight. In this situation, where the population has collapsed and there is overfishing, it should be set at zero. This is the only way to prevent exceeding the total HG of zero, and thereby complying with the CPS FMP

Conclusion

The draft 2015 Pacific sardine assessment indicates the Northern sardine population has collapsed below the CUTOFF threshold and the harvest guideline must therefore be set at zero. The sardine collapse has been exacerbated by overfishing and application of a harvest control rule that has allowed continued fishing on a precipitously declining population. This is a critical juncture in the management of Pacific sardines, as any further fishing mortality on sardines will further accelerate the current decline to the detriment of West Coast fishing communities and sardine predators that are already starving to death in unprecedented numbers.

Action must be taken swiftly to rebuild the sardine population and to fix the fundamental parameters of the harvest control rule such that the fishery does not resume until the stock has recovered over a CUTOFF of at least 640,000 metric tons. The effects of this population collapse are clearly evident above the water with starving sea lions and Brown Pelicans, but this is likely only be the tip of the iceberg. The consequences of the overfishing that has already occurred will undoubtedly have long term deleterious impacts on the California Current marine ecosystem. The ripple effects of the lack of sardine could reverberate throughout the ecosystem and coastal communities for years to come. Any further fishing mortality will increase the severity of these impacts and risks.

²¹ PFMC CPS FMP at 43

²² Id at 44.

Ms. Dorothy Lowman, PFMC
Pacific Sardine Management
Page 9 of 9

Please take immediate action to stop overfishing and protect the role of sardines and other Coastal Pelagic Species in the California Current Ecosystem.

Sincerely,

A handwritten signature in black ink, appearing to read "B. Enticknap", with a long horizontal flourish extending to the right.

Ben Enticknap
Pacific Campaign Manager

A handwritten signature in black ink, appearing to read "Geoff Shester", with a long horizontal flourish extending to the right.

Geoffrey G. Shester, Ph.D.
California Campaign Director