Following are examples of 2,440 emails received asking the Council to adopt a new overfishing limit and more protective management for the central subpopulation of northern anchovy

From: **George Loveday** <atharmony@everyactioncustom.com>
Date: Thu, Mar 30, 2017 at 9:34 AM
Subject: Please protect anchovies and the birds that depend on them
To: pfmc.comments@noaa.gov

Dear Chair Herb Pollard,
I am writing to ask the Council to adopt management measures, based on the best available science, that protect northern anchovies' crucial role in the Pacific Ocean food web. In particular, I ask that you establish a new overfishing limit in response to recent information about the status of the stock. I also ask that you consider long-term policies that protect anchovy stock near vital wildlife areas, such as breeding sites for Brown Pelican. These types of limits can ensure adequate prey for dependent predators, prevent overfishing, and support strong coastal communities.

Northern anchovies are among the most important forage fish in the California Current ecosystem, but existing management of the stock is based on decades-old information. These fish are a critical food source for Brown Pelican, salmon, tuna, sea lions, humpback whales, and dozens of other marine species.

Not only will the deprecation of anchovies spell the demise of birds, but larger fish in the food chain. I might add that harvesting small fish for pet food is just plain stupid.

Again, in light of new scientific studies showing that anchovies are now at very low numbers and that predators may be bearing the brunt of these declines, I encourage you to act now to protect the stock of northern anchovy.

Sincerely,
George Loveday
Grass Valley, CA 95949-9711

From: **Janice Gloe** <rainglo@everyactioncustom.com>
Date: Thu, Mar 30, 2017 at 9:46 AM
Subject: Please protect anchovies and the birds that depend on them
To: pfmc.comments@noaa.gov

Dear Chair Herb Pollard,

I am writing to ask the Council to adopt management measures, based on the best available science, that protect northern anchovies' crucial role in the Pacific Ocean food web. In particular, I ask that you establish a new overfishing limit in response to recent information about the status of the stock. I also ask that you consider long-term policies that protect anchovy stock near vital wildlife areas, such as breeding sites for Brown Pelican.
These types of limits can ensure adequate prey for dependent predators, prevent overfishing, and support strong coastal communities.

Northern anchovies are among the most important forage fish in the California Current ecosystem, but existing management of the stock is based on decades-old information. These fish are a critical food source for Brown Pelican, salmon, tuna, sea lions, humpback whales, and dozens of other marine species.

Again, in light of new scientific studies showing that anchovies are now at very low numbers and that predators may be bearing the brunt of these declines, I encourage you to act now to protect the stock of northern anchovy.

Sincerely,
Janice Gloe

Dear Chair Herb Pollard,
I am writing to ask the Council to adopt management measures, based on the best available science, that protect northern anchovies' crucial role in the Pacific Ocean food web. In particular, I ask that you establish a new overfishing limit in response to recent information about the status of the stock. I also ask that you consider long-term policies that protect anchovy stock near vital wildlife areas, such as breeding sites for Brown Pelican.
These types of limits can ensure adequate prey for dependent predators, prevent overfishing, and support strong coastal communities.

Northern anchovies are among the most important forage fish in the California Current ecosystem, but existing management of the stock is based on decades-old information. These fish are a critical food source for Brown Pelican, salmon, tuna, sea lions, humpback whales, and dozens of other marine species.
Again, in light of new scientific studies showing that anchovies are now at very low numbers and that predators may be bearing the brunt of these declines, I encourage you to act now to protect the stock of northern anchovy.

Sincerely,
Kay Gillis
Kentfield, CA 94904-1036

From: **Sheri Armendariz** <sheri@everyactioncustom.com>
Date: Thu, Mar 30, 2017 at 7:58 AM
Subject: The circle of life- all needs to be protected to work.
To: pfmc.comments@noaa.gov

Dear Chair Herb Pollard,
I am writing to ask the Council to adopt management measures, based on the best available science, that protect northern anchovies' crucial role in the Pacific Ocean food web. In particular, I ask that you establish a new overfishing limit in response to recent information about the status of the stock. I also ask that you consider long-term policies that protect anchovy stock near vital wildlife areas, such as breeding sites for Brown Pelican.
These types of limits can ensure adequate prey for dependent predators, prevent overfishing, and support strong coastal communities.

Northern anchovies are among the most important forage fish in the California Current ecosystem, but existing management of the stock is based on decades-old information. These fish are a critical food source for Brown Pelican, salmon, tuna, sea lions, humpback whales, and dozens of other marine species.
Again, in light of new scientific studies showing that anchovies are now at very low numbers and that predators may be bearing the brunt of these declines, I encourage you to act now to protect the stock of northern anchovy.

Sincerely,
Sheri Armendariz
Encinitas, CA 92024-2732

Linn D. Barrett
4305 29th Street Road
Greeley, CO 80634

Pacific Fishery Management Council
7700 NE Ambassador Place
Suite 101
Portland, Oregon 97220-1384

March 13, 2017

Re: Northern Anchovies

Dear Chair Pollard and Council Members:

I am aware that Northern anchovies are among the most important forage fish in the California Current ecosystem, and serve as a critical food source for salmon, tuna, brown pelicans, sea lions, humpback whales, and dozens of other marine species. I also am aware that anchovies are now at very low numbers; therefore I ask you to please direct the PFMC to break away from the existing anchovy management plan and adopt management measures that are designed to protect northern anchovies. Thank you.

With utmost conviction and sincerity,

Linn D. Barrett

THE PEW CHARITABLE TRUSTS

111 SW Columbia Street, Suite 200
Portland, Oregon 97201
pewtrusts.org

March 30, 2017

Mr. Herb Pollard, Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220

RE: Agenda Item G.2 – Central Subpopulation of Northern Anchovy Overfishing Limit Process

Dear Chair Pollard and Council Members:

We write with respect to the Pacific Fishery Management Council's (Council) consideration and review of alternatives for updating the overfishing limit (OFL) for the central subpopulation of northern anchovy (CSNA). As part of this agenda item, and in response to the most recent and best available scientific information indicating that the central subpopulation remains at very low levels, we request that the Council take the following actions at its April 2017 meeting:

- Initiate development of an interim updated OFL for CSNA in order to prevent overfishing, ensure adequate forage for dependent predators, and reflect best available science as required by the Magnuson-Stevens Fishery Conservation and Management Act (MSA).
- Prioritize completion of a full stock assessment for CSNA to inform development of both a long-term OFL and a broader ecosystem-based management strategy for the fishery.
- Initiate a Fishery Management Plan (FMP) amendment to eliminate the monitored stock category from the Coastal Pelagic Species (CPS) FMP to ensure that adequate science and management attention is given to all CPS, including CSNA.

As the Council is aware, northern anchovy is a keystone forage species in the CCE and is preyed upon by a wide variety of marine wildlife, including commercially and recreationally valuable fish, mammals, and seabirds.[1] In fact, northern anchovy is the single most important prey species for CCE seabirds[2] and first or second most important for the broader suite of marine predators, such as humpback whales, chinook salmon, dolphins, and pinnipeds.[3]

For several years, The Pew Charitable Trusts and other conservation organizations have expressed concerns to the Council about the status of anchovy and the lack of active

[1] Pacific Fishery Management Council, July 2013, Ecosystem Initiatives Appendix to the Pacific Coast Fishery Ecosystem Plan, at A-11.
[2] Szoboszlai, A.I., J.A. Thayer, S.A. Wood, W.J. Sydeman, L.E. Koehn. 2015. Forage species in predator diets: Synthesis of data from the California Current. *Ecological Informatics* 29:45-56.
[3] Ainley, D. et al. 2015. California current system – predators and the preyscape. *Journal of Marine Systems* 146: 1-2.

management of this stock, especially in light of increased fishing effort.[4] More recently, our organizations, as well as the U.S. Fish and Wildlife Service (USFWS), have voiced concerns regarding low biomass of anchovy in the CCE and associated impacts on marine predators, and in particular brown pelicans.[5, 6]

Here, we reiterate those concerns and note that the most recent data show that CSNA remains at low abundance through 2016,[7] while management measures, including OFL and annual catch limits, remain unchanged. These fixed management measures are the result of a monitored stock control rule that was originally designed to be precautionary, but which did not anticipate the dramatic declines experienced by CSNA over the last decade.[8] Consequently, the central subpopulation is being managed under an OFL that is very likely significantly higher than it should be given the current status of the stock. The high level of uncertainty surrounding the existing OFL, and its ability to prevent overfishing, may be placing both CSNA and dependent predators at risk.

For the April 2017 meeting, we ask that the Council take near-term action to ensure that northern anchovy are managed with precaution, utilizing the most recent and best available scientific information to develop and adopt an updated OFL for the central subpopulation. Below we discuss our specific recommendations in greater detail:

A. Immediately initiate development of an interim updated OFL for CSNA.

Under the MSA, the Council's primary mandate is to prevent overfishing while achieving optimum yield (OY) for each fishery that it manages.[9] In meeting this core obligation, the Council is also required to utilize best available science.[10] Currently, the best available science on anchovy biomass[11] indicates that the central subpopulation has been in a collapsed state since 2009 and has not recovered as of 2016, despite high levels of egg and larval production that were

[4] Pacific Fishery Management Council, November 2015, Public Comment under Agenda Item H.3; Pacific Fishery Management Council, June 2015, Supplemental Public Comment under Agenda Item G.3; Pacific Fishery Management Council, September 2014, Supplemental Public Comment under Agenda Item I.6.
[5] Pacific Fishery Management Council, November 2016, Agenda Item G.4.b, Supplemental Public Comment 2; Pacific Fishery Management Council, September 2016, Agenda Item E.3.b, Supplemental Public Comment 2.
[6] Pacific Fishery Management Council, November 2016, Agenda Item G.4.a, U.S. Fish and Wildlife Service Report; Pacific Fishery Management Council, September 2016, Agenda Item E.3.a, U.S. Fish and Wildlife Service Report; Pacific Fishery Management Council, November 2015, Agenda Item H.3.a, U.S. Fish and Wildlife Service Report; Pacific Fishery Management Council, June 2015, Agenda Item G.3.a, U.S. Fish and Wildlife Service Report.
[7] MacCall, A. D., W. J. Sydeman, P. C. Davison, J. A. Thayer. 2016. *Recent Collapse of Northern Anchovy Biomass off California*. Fisheries Research. 175:87-94; Thayer, J.A., A.D. MacCall, P.C. Davison, W.J. Sydeman. In prep. *California Anchovy Population Remains Low, 2012*-2016; Zwolinkski, J., D.A. Demer, B.J. Macewicz, G.R. Cutter, Jr., S. Mau, D. Murfin, J.S. Renfree, T.S. Sessions, K. Stierhoff. November 2016. *Distribution and Biomass of the Central-Stock Northern Anchovy During Summer 2015, Estimated from Acoustic-Trawl Sampling*. NOAA Technical Memo; Pacific Fishery Management Council, March 2017, *California Current Integrated Ecosystem Assessment (CCIEA) California Current Ecosystem Status Report*, Agenda Item F.1.a, NMFS Report 1.
[8] MacCall *et al*., 2016.
[9] 50 C.F.R. § 600.310(a)
[10] 50 C.F.R. § 600.305(e)(1)
[11] MacCall *et al*. 2016; Thayer *et al*., In prep.; Zwolinski *et al*., 2016; see also comments from Earthjustice and Oceana re: RIN 0648-XC808; Fisheries off West Coast States; Coastal Pelagic Species Fisheries; Multi-Year Specifications for Monitored and Prohibited Harvest Species Stock Categories, December 2015, pages 5-9.

observed in 2014, 2015, and 2016. In fact, the most recent information shows that current biomass may be as much as ten times below the range of stock sizes upon which existing status determination criteria (SDCs) and reference points are based.[12] These significant declines in anchovy abundance warrant immediate Council consideration of revised management measures, particularly given that existing measures, including an OFL of 100,000 metric tons (mt), are based on a long-term average MSY value derived from a 1991 bio-economic model[13] that cannot be reasonably described as the most current and best available science on the status of the stock.[14]

In light of these concerns regarding the current status of the stock, and the associated risk that the current OFL and monitored stock control rule are not sufficiently precautionary given the central subpopulation's demonstrated capacity to decline by as much as 97%,[15] we suggest that near-term adoption of an interim OFL is needed in order to prevent overfishing while a new long-term OFL is developed.

Joint SSC/CPSMT Report on OFL Options and Process

In response to a November 2016 request from the Council, the CPS Subcommittee of the Science and Statistical Committee (SSC) and the CPS Management Team (CPSMT) developed a joint report[16] that describes several methods for developing an updated OFL for CSNA, along with associated processes and timelines for each option. We note that two of the four methods included in the report, Options A and C, are essentially "management-ready" approaches that can be implemented in the near-term, using existing data and F_{MSY} values.

Of the two near-term methods outlined in the Joint SSC/CPSMT Report, we suggest that Option C would yield the most robust and timely result, as it utilizes an abundance estimate generated from available survey data multiplied by an F_{MSY} value selected by the SSC; it is also consistent with the OFL formula for actively managed stocks as described in the CPS FMP.[17] Option A, on the other hand, would set OFL as an MSY value derived from the bio-economic model described in Conrad 1991, while extending the time-series to include more recent data – a task that could be complicated by the lack of a sufficiently extensive time-series of recent CSNA abundance and the fact that Conrad himself cautioned against using his MSY values for management applications.[18]

[12] Thayer *et al*., 2016; Zwolinksi *et al*., 2016.
[13] Conrad, J.M. 1991. A Bioeconomic Analysis of the Northern Anchovy. Working paper in agricultural economics. Department of Agricultural Economics. New York State College, Ithaca, New York.
[14] In its November 2016 Supplemental Report on Northern Anchovy Stock Assessment and Management Measures, the SSC described the current CSNA OFL as being "based on a model using data from a historical period and collected under dramatically different environmental and abundance conditions."
[15] MacCall *et al.*, 2016.
[16] Pacific Fishery Management Council, April 2017, Agenda Item G.2.a, Joint SSC/CPSMT Report on Central Subpopulation of Northern Anchovy Overfishing Limit Process.
[17] Pacific Fishery Management Council, Coastal Pelagic Species Fishery Management Plan (as amended through Amendment 15). At 35.
[18] Conrad, 1991. At 8.

We request that the Council task the SSC with recommending an interim updated OFL utilizing Option C with Sub-Option 1 from the Joint SSC/CPSMT Report, such that a new OFL value may be considered and adopted by the Council prior to the end of 2017.

As specified in the Joint SSC/CPSMT Report, Option C would set the OFL as FMSY multiplied by an estimate of absolute abundance.[19] The Joint Report also identifies a number of potential FMSY sources under Option C that the SSC could consider utilizing, including Sub-Option 1, one of the FMSY values for CSNA as described in NOAA Fisheries' August 2016 review of Minimum Stock Size Thresholds (MSST) for CPS finfish.[20] Because these values are the result of the most recent analysis of biological reference points, we suggest that selecting the average FMSY (0.266) included in Table 6 of the MSST Report[21] provides an efficient and reasonable approach to calculating an updated OFL in the near-term.

Regarding an estimate of absolute abundance for CSNA, the Joint SSC/CPSMT Report lays out an approach under Option C for generating such an estimate using data from the Acoustic Trawl Method (ATM) survey. An ATM biomass estimate from the 2016 summer California Current Ecosystem Survey may be available as soon as the April Council meeting, and we recommend that this estimate be used, in conjunction with the FMSY value discussed above, to calculate an interim updated OFL for CSNA prior to the end of 2017. If a 2016 ATM biomass estimate is unavailable for any reason, the SSC could instead use the 2015 estimate (the first year that the ATM survey was deemed appropriate for estimating CSNA biomass, due to wider distribution of the stock within the survey area),[22] as this would still represent the most recent and best available information on the status of the stock. The 2015 ATM biomass estimate for CSNA is 31,427 mt.[23]

The Joint SSC/CPSMT Report also indicates that utilizing an estimate of absolute biomass based on ATM survey data for the purpose of updating OFL may first require completion of an ATM methodology review, which is scheduled for early 2018. We strongly support this methodology review going forward and are encouraged that it may result in improved management of northern anchovy and other CPS in the CCE. However, for the reasons detailed below, we suggest that an estimate of absolute CSNA abundance based on ATM survey data can be used for the purpose of setting an interim updated OFL in the near term, prior to the methodology review taking place. Given that relevant biomass data and FMSY values are currently available to the Council, waiting an additional year (until Spring 2018) to set an updated OFL would constitute an unnecessary delay and may run counter to the MSA's requirement that "management measures and reference points…be based on the best scientific information available."[24]

[19] Joint SSC/CPSMT Report. At 2.
[20] NOAA Fisheries, September 2016, *Review and Re-evaluation of Minimum Stock Size Threshold for Finfish in the Coastal Pelagic Fisheries Management Plan for the U.S.* Agenda Item E.1.a, Supplemental NMFS Report.
[21] *Ibid*. At 17.
[22] Pacific Fishery Management Council, September 2016, *Report of the NOAA Southwest Fisheries Science Center & Pacific Fishery Management Council Workshop on CPS Assessments*, Agenda Item E.2.a, Stock Assessment Workshop Report. At 5.
[23] Pacific Fishery Management Council, November 2016, Agenda Item G.4.a, SWFSC Supplemental Report.
[24] 50 C.F.R. § 600.305(e)(1)

Utilizing Existing ATM Survey-Based Biomass Estimates to Calculate an Updated OFL

The Joint SSC/CPSMT Report identifies a primary concern with using ATM-based biomass estimates to generate an updated OFL: because the ATM survey is unable to sample waters inshore of 50 meters and portions of the upper water column, correction factors must first be derived in order to estimate the proportion of the biomass inshore of the survey area as well as the biomass missed in surface waters. While we agree that the application of such correction factors would yield a more complete picture of CSNA abundance, and allow for ATM survey estimates to be fully calibrated to account for unsampled areas, it is our understanding that especially given the current low abundance of the stock, these correction factors are unlikely to substantially affect the overall biomass number.

With respect to the role of missed inshore CSNA biomass in estimating overall abundance, in a recent paper,[25] Davison et al. describe (as have others[26]) the tendency of anchovy to contract shoreward during periods of low abundance. As these inshore waters are not accessible to ATM survey vessels, anchovy found there are generally not "seen" or counted by the ATM survey (or other surveys such as CalCOFI cruises). The question remains whether this missed inshore biomass is large enough to appreciably alter the results of a survey-based abundance estimate. Davison finds that the relatively limited area covered by inshore waters is simply too small to translate into a large biomass of CSNA, particularly during periods of low overall abundance: "…it is clear that even though there is a dense population of anchovy nearshore, it doesn't amount to a large biomass due to the restricted spatial distribution."[27] Davison goes on to conclude:

> "Although there were anecdotal reports of large anchovy schools close to shore (Goode 2013; Herreria 2014), even if anchovy spawned there unobserved by CalCOFI ichthyoplankton sampling, underway CUFES egg sampling, JRS trawls, Spring CPS rope trawls, and the AT survey, it must have been confined to a narrow strip along the shore. A large concentration of fishes multiplied by a small surface area results in a small biomass at oceanic scales."[28]

This inability of spatially restricted inshore areas to contribute enough biomass to appreciably increase overall anchovy abundance appears to be corroborated by available aerial survey data. Aerial surveys are generally considered to be especially useful for estimating inshore biomass, yet aerial survey data between 2013 and 2016 indicated very low CSNA abundance, with a maximum of 14,532 mt observed during Summer 2013[29] and only three schools of less than 60 mt each observed in Summer 2016.[30]

Aerial surveys also have relevance to the stated concern regarding missed CSNA biomass in surface waters, as these surveys cover the upper water column in particular. If aerial surveys

[25] Davison, P.C., W.J. Sydeman, J.A. Thayer. 2017. *Are There Temporal or Spatial Gaps in Recent Estimates of Anchovy off California?* CalCOFI Rep., Vol. 58.
[26] MacCall *et al*., 2016.
[27] Davison *et al*., 2017. At 11.
[28] *Ibid*. At 12.
[29] Pacific Fishery Management Council, June 2015, Agenda Item G.3.a, Supplemental CDFW Report.
[30] Pacific Fishery Management Council, November 2016, Agenda Item G.2, Attachment 1.

failed to observe substantial anchovy biomass in any of the past four years, it appears much more likely that the ATM survey did not miss anchovy in the upper water column during this same period, but rather that the fish may not have been there to begin with.

Finally, we note that the acoustics team at the Southwest Fisheries Science Center (SWFSC) describes its 2015 ATM biomass estimate for CSNA as a "negatively-biased minimum estimate of anchovy abundance," even in the absence of a correction factor.[31] A central consideration for the Council and the SSC is whether such an estimate (or the forthcoming 2016 ATM biomass estimate for CSNA) represents a more appropriate and precautionary basis for management than the long-term MSY value derived from Conrad 1991. Given that any recent survey-based biomass estimate is certain to be more reflective of current stock status than the range of abundance estimates between 1964 and 1990 upon which existing management measures is based, we suggest that a near-term update of the OFL for CSNA (using the most recently available ATM survey estimate of absolute abundance) is indeed warranted and necessary in order to avoid the risk of overfishing while a new long-term OFL is developed.

B. Prioritize completion of a stock assessment for CSNA to inform development of a long-term OFL and a broader ecosystem-based management strategy for the fishery that accounts for the needs and status of dependent predators.

We appreciate the Council's attention over the last several years to the need for a new stock assessment for CSNA, and we thank NOAA Fisheries for its commitment to completing an integrated assessment as soon as "the appropriate biological information can be collected, verified, and processed."[32] As Pew and others have noted in previous letters to the Council, such an assessment is vital to establishing science-based SDCs and reference points for CSNA, and is foundational to developing a long-term ecosystem-based framework for the stock.

In the Joint SSC/CPSMT Report on the OFL-setting process, Option B describes how to calculate an OFL "that is based on an estimate of F_{MSY} and a biomass estimate from a stock assessment;" this approach first requires the development of an integrated assessment model and then fitting the model to various data such as a time-series of age data and trends in abundance indices.[33] We strongly support the use of Option B for calculating a new long-term OFL, and ask that the Council and NOAA Fisheries prioritize the completion of a new integrated stock assessment for CSNA in the next two years.

Once completed, we request that this assessment be utilized – along with associated modeling data, specifically on CCE predator/prey dynamics – to develop a long-term strategy for sustainably managing this fishery, including adoption of an ecosystem-based harvest control rule and CUTOFF that reflects current biological conditions. Newer and better information on northern anchovy will allow the Council to set biological reference points, status determination criteria, and catch levels for this stock with a much higher degree of certainty; prevent overfishing; better understand the cyclical nature of anchovy and its relationship to Pacific sardine; and maintain the role of northern anchovy in the CCE. Such a framework would account

[31] Pacific Fishery Management Council, November 2016, Agenda Item G.4.a, SWFSC Supplemental Report.
[32] *Ibid*. At 5.
[33] Joint SSC/CPSMT Report. At 2.

for ecosystem needs – with an emphasis on the forage requirements and status of dependent predators – as well as the social and economic factors consistent with achieving Optimum Yield, including the development of precautionary management measures.

C. Initiate an FMP amendment to eliminate the monitored stock category from the CPS FMP to ensure that adequate science and management attention is given to all CPS.

We encourage the Council to begin a process to eliminate the Monitored stock category from the CPS FMP. Removal of this category would help ensure consistency with the MSA, which does not include a Monitored category for stocks in a fishery. National Standard (NS) 1 guidelines state that, "Councils should identify in their FMPs the stocks that require conservation and management. Such stocks must have ACLs, other reference points, and accountability measures. Other stocks that are identified in an FMP (i.e., [ecosystem component] species or stocks that the fishery interacts with but are managed primarily under another FMP…do not require ACLs, other reference points, or accountability measures."[34]

Therefore, either a stock is considered to be in the fishery (i.e., in need of conservation and management) and these requirements must be met, or it is an ecosystem component species and not the subject of a directed fishery, or it is classified as unmanaged. In order to ensure that adequate management and scientific attention is paid to all CPS that are the subject of directed fisheries, including northern anchovy, the Council should remove the Monitored category from the CPS FMP. As indicated in a white paper on anchovy management prepared by the CPSMT last summer, the Council could opt to amend the FMP to do so.[35]

Once such an FMP amendment has been adopted, all stocks in the CPS fishery that are not ecosystem component species would be categorized as Actively managed – or, in the absence of a Monitored category, simply "managed." This would allow the Council to ensure that adequate science and management attention is given to all CPS. However, we recognize that FMP amendments can require multiple Council meetings to complete, along with staff and advisory body resources. Given concerns regarding the current status of the stock and associated impacts to dependent predators, we request that the central subpopulation of northern anchovy be moved to active management status in the near term while the Council considers amending the CPS FMP to remove the Monitored stock category altogether.

Conclusion

In conclusion, we ask that the Council task the SSC with recommending an interim updated OFL for CSNA prior to the end of 2017. The most recent data on the status of CSNA indicates that the stock remains at very low levels, and is likely an order of magnitude below the range of stock sizes upon which existing SDCs and reference points are based. In the absence of evidence showing juvenile recruitment into the spawning stock, and a continued lack of adult anchovy presence in existing surveys, near-term action is needed to prevent overfishing in the interim while a new long-term OFL is developed. We also request that a full stock assessment be

[34] 50 C.F.R. § 600.310(d)(1).
[35] Pacific Fishery Management Council, September 2016, Agenda Item E.3.a, Coastal Pelagic Species Management Team Report on Anchovy Management Update.

prioritized for completion in order to inform development of such a long-term OFL, along with an ecosystem-based management framework for the central subpopulation of northern anchovy. Finally, we recommend eliminating the monitored category from the CPS FMP and moving northern anchovy into active management.

Thank you for your consideration, and for your work to ensure sustainable fishing and healthy ocean ecosystems.

Sincerely,

Paul Shively
Project Director, U.S. Oceans, Pacific
The Pew Charitable Trusts

Gilly Lyons
Officer, U.S. Oceans, Pacific
The Pew Charitable Trusts

Audubon CALIFORNIA

SAN DIEGO AUDUBON SOCIETY

Sea and Sage Audubon Society

Mr. Herb Pollard, Chair
Pacific Fishery Management Council
1100 NE Ambassador Place, #101
Portland, OR 97220

March 30, 2017

Re: Agenda item G2: Central Subpopulation of Northern Anchovy Overfishing Limit Process

Dear Mr. Pollard and Council Members,

On behalf of Audubon California, San Diego Audubon, and Sea and Sage Audubon, we are writing to request the Council and NMFS immediately put in place interim revisions to harvest specifications for the central subpopulation of northern anchovy (CSNA) for the 2018 commercial fishing season. We also would like to express support for Council and NMFS action to move forward with methodology review and an integrated stock assessment that will over the longer term establish an ecosystem based management framework for CSNA.

Audubon members in Southern California and across the state care deeply about anchovy-dependent southern California marine and coastal birds including brown pelican, the federally endangered California least tern, and sooty shearwater. Sea and Sage Audubon has 3,000 and members, serves all of Orange county, and has partnerships with agencies to steward three California least tern colonies (at Santa Ana River, Huntington Beach, and Bolsa Chica). Sea and Sage Audubon also conducts four pelagic marine birding trips per year. San Diego Audubon and many of its 2500 members have worked collaboratively with the City of San Diego in restoring and maintaining sensitive habitat for endangered California least terns at the colony in Mission Bay. In 2016 alone, over 800 of the chapter's volunteers donated more than 2,000 hours of time in these efforts. These volunteers have worked with Mission Bay Park Rangers to remove invasive vegetation, repair chick fencing, and place protective structures on site. Audubon California's 60,000 members have a strong interest in ensuring federal and state fisheries

management is compliant with Magnuson-Stevens Act requirements to ensure adequate forage for dependent predators.

Importance of anchovy to seabirds

As the Council is well aware, northern anchovy is a keystone forage species in the California Current Ecosystem (CCE) and is preyed upon by a wide variety of marine wildlife, including commercially and recreationally valuable fish, mammals, and seabirds.[1] Anchovy is the single most important prey species for CCE seabirds.[2] For adult survival and/or reproductive success, adult or 1+ age classes are likely to be preferable for larger bodied seabirds such as brown pelicans, Brandt's cormorants and common murre, and by single bill load birds such as California Least Tern.

Anchovy stock collapse since 2009 and updated biomass estimates

In March 2017, the NOAA California Current IEA Team delivered the "2017 California Current Ecosystem Status Report" that summarized 2016 and previous information on adult and larval anchovy abundance in the CCE. According to multiple indicators on the presence of CSNA in the CCE system as of summer 2016, there is no evidence that age 1+ anchovy have recovered from the collapse that began around 2009.[3] The report notes for the northern CCE "Catches of both age 1+ sardine and age 1+anchovy were relatively poor," for the central CCE "Catches of adult anchovy and sardine remained near zero," and for the southern CCE "There was an increase in the relative abundance of anchovy larvae." California Department of Fish and Wildlife spotter planes in summer 2016 found three schools of anchovy ranging in size between 21-60 MT from Pt Conception to Mexico border.[4] This follows and is consistent with low observations of anchovy school of between 490-5000 MT in recent years.[5] These planes includes nearshore areas not covered by the most nearshore ATM vessel sampling stations. All these multiple lines of evidence suggest a spawning event in 2016, yet how this translates to age 1+ fish is unknown.

Currently, the best available estimates of stock biomass are found in Thayer et al (2016) which estimated the four-year average of biomass in U.S. and Mexican waters in 2012-2015 to be 24,300 mt.[6] The 2015 NMFS ATM biomass estimate for the portion of the CSNA in U.S. waters is 31,427 metric tons.[7] The current ABC of 25,000 metric tons – set when the stock size was much larger- falls within these best available estimates. This alone warrants an immediate interim adjustment to OFL and ABC, in advance of an integrated stock assessment and development of CUTOFF and other reference points.

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[1] Pacific Fishery Management Council, July 2013, Ecosystem Initiatives Appendix to the Pacific Coast Fishery Ecosystem Plan, at A-11.

[2] Szoboszlai, A. et al. 2016. Data synthesis for understanding predator forage needs: A case study from the California Current. *Ecological Archives*.

[3] http://www.pcouncil.org/wp-content/uploads/2017/03/F1a_Sup_CCIEA_PPT_V03102017_Mar2017BB.pdf

[4] http://www.pcouncil.org/wp-content/uploads/2016/11/G2a_Sup_CDFW_CWPA_PPT_KirkLynn_AerialSurvey_MethodReviewProposal_NOV2016BB.pdf

[5] Pacific Fishery Management Council, June 2015, Agenda Item G.3.a, Supplemental CDFW Report.

[6] Thayer, J.A., MacCall, A.D., Davison, P.C., and Sydeman, W.J. (2016). California Anchovy Population Remains Low, 2012-2016. Farallon Institute.

[7] Zwolinksi, J.P., Demer, D.A., Macewicz, B.Jl, Cutter, G.R., Mau, S. Murfin, D., Renfree, J.S., Sessions, T.S. and Stierhoff, K. (2016). The Distribution and Biomass of the Central-Stock Northern Anchovy During Summer 2015, Estimated from Acoustic-Trawl Sampling. *Draft of NOAA Technical Memorandum November 2016*, Appendix 1, *available* at http://www.pcouncil.org/wp-content/uploads/2016/11/G4a_Sup_SWFSC_Rpt2_NOV2016BB.pdf

Council motions in 2016 and Audubon requests in 2017

In November 2016, the Council directed the Southwest Fisheries Science Center (SWFSC), the Scientific and Statistical Committee (SSC), the Coastal Pelagic Species Management Team (CPSMT), and the Coastal Pelagic Species Advisory Subpanel (CPSAS) to continue work to develop "an integrated stock assessment and procedures for setting and updating" an OFL, ABC, and MSST for the CSNA.[8] The Council also directed the SSC to identify alternative approaches for developing a revised OFL for the CSNA, and a process and timeline to consider OFL alternatives, for discussion at the April 2017 Council meeting. We appreciate the SCC's work to develop approaches to setting OFL following the November 2016 meeting. Our requests are as follows:

1. **NMFS and the Council use Option C in the joint SSC/CPSMT report[9] to develop a new OFL for the CSNA based on the most recent, best available estimate of stock biomass; an estimate of fishing mortality consistent with achieving maximum sustainable yield (Fmsy); and the distribution of the stock in U.S. waters.**

The most recent analysis of biological reference points in the NMFS Minimum Stock Size Threshold report found an average F_{MSY} of 0.266 derived from models based on eight stock-recruitment relationship scenarios for the CSNA.[10] This F_{MSY} estimate could be immediately applied to develop a new ABC. We also ask that the Council set an ABC and new MSST based on the best scientific information available.

The Council does not need to wait for methodology review to proceed with these actions. Rather, these actions are a prudent interim measure that will allow the Council achieve Magnuson Act requirements to prevent Overfishing, ensure adequate forage for dependent predators, and reflect best available science. In sum, the CPS FMP provides the Council with the ability to adopt a revised OFL, ABC, and ACL for northern anchovy in the near term to reflect best available science.

2. **NMFS and the Council develop and complete a full stock assessment and ecosystem based management framework to inform future management.**

We appreciate and support Option B in the SSC/CPS MT joint OFL report which provides a pathway to establish a harvest control rule, including a CUTOFF, for setting allowable catch levels that achieve optimum yield.

3. **The Council task the CPSMT with evaluating time area closures for seabirds and other marine predators, notably in Monterey Bay, around the Channel Islands, and near least tern colonies in the Southern California Bight.**

In order to fully account for the needs of dependent predators, as required by the MSA,[11] an ecosystem-based management framework for northern anchovy should also include consideration of time-area

[8] Pacific Fishery Management Council, Draft Motion, Agenda Item G.4 (Nov. 2016), *available at* http://www.pcouncil.org/wp-content/uploads/2016/11/G4_CouncilAction_NOV2016.pdf.
[9] http://www.pcouncil.org/wp-content/uploads/2017/03/G2a_SSCandCPSMT_Rpt_Apr2017BB.pdf
[10] NMFS (2016) Review and Re-evaluation of Minimum Stock Size Threshold for Finfish in the Coastal Pelagic Fisheries Management Plan for the U.S. Agenda Item E.1.a, Supplemental NMFS Report, Table 6.
[11] 16 U.S.C. § 1802(33), 1851(a)(1); 50 C.F.R. 600.310(e)(3)(iii)(C).

closures. There are two primary reasons for doing so: to account for anchovy's availability to central-place foragers such as brown pelican and common murre, which are heavily dependent on availability of northern anchovy within foraging distance of colonies; and to prevent localized depletion of anchovy in Monterey Bay. Key geographies in this regard are the Channel Islands, Farallon Islands, and Monterey Bay, all of which are globally Important Bird Areas. In its June 2015 report to the Council, the USFWS noted that "northern anchovy availability within foraging distance of colonies is the most important factor influencing pelican breeding success within the Southern California Bight."[12] The USFWS further states in its September 2016 report to the Council that "we encourage the Council to consider measures based not only on biomass but also on the stock's spatial and temporal availability to marine predators."[13] Monterey Bay, where 99% of 2015 anchovy landings occurred, is a key year-round foraging area for Pacific predators. [14] There is precedent in the CPS FMP amendment process, as well as in existing state fisheries management, for time-area closures that are designed to protect forage for marine wildlife. In the CPS FMP, area closures were last formally considered in the process to develop the Amendment 5.[15]

Marine birds use a diversity of prey items across seasons and geographies, however, anchovy, together with juvenile rockfish, can reasonably be described as the most important single prey species for the millions of breeding and visiting seabirds in Mexico through Oregon. Numerous seabirds including brown pelicans, short-tailed, sooty, Buller's, flesh-footed, pink-footed, and black-vented shearwaters, common murres, rhinocerous auklets, Craveri's murrelet, Scripps's murrelet, and California least tern all rely on anchovy for one or more seasons of the year.[16,17] Additional supporting information for the importance of adequate prey for locally breeding birds is enumerated below.

- Brown Pelican

As the USFWS has repeatedly reported to the Council in 2015 and 2016, brown pelicans have experienced mortality events and breeding failures range-wide from 2008-2014, indicating the low availability of forage in the CCE.[18] Catastrophic breeding failures have occurred from 2014-2016 in the Gulf of California,[19]which accounts for approximately 62% of the total California brown pelican breeding population.[20]

The Pacific Fisheries Management Council has a statutory responsibility to ensure a forage reserve for brown pelicans. The Federal Register notice of removal of the brown pelican from the Endangered Species List notes that:

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[12] Pacific Fishery Management Council, June 2015, Agenda Item G.3.a, U.S. Fish and Wildlife Service Report.
[13] Pacific Fishery Management Council, September 2016, Agenda Item E.2.b, U.S. Fish and Wildlife Service Report.
[14] Block, B., Jonsen, I., Jorgensen, S., Winship, A., Shaffer, S., Bograd, S., Hazen, E. Foley, D., Breed, G., Harrison, A., Ganong, J., Swithenbank, A., Castleton, M., Dewar, H., Mate, B.. Shillinger, B., Schaefer, K., Benson, S., Weise, K., Henry, R., and D. Costa. 2011. Tracking apex marine predator movements in a dynamic ocean. *Nature* 475:86–90.
[15]Coastal Pelagic Species Fishery Management Plan (as amended through Amendment 15), at 5.
[16] Sydeman, W. et al. 2001. Climate change, reproductive performance and diet composition of marine birds in the southern California Current system, 1969–1997. Progress in Oceanography 49: 309–329
[17] Thayer, J. et al. 2008. Forage fish of the Pacific Rim as revealed by diet of a piscivorous seabird: synchrony and relationships with sea surface temperatureCan. J. Fish. Aquat. Sci. 65: 1610–1622
[18] Pacific Fishery Management Council, June 2015, Agenda Item G.3.a, USFWS Report.
[19] D. Anderson, pers. comm.
[20] Anderson, D. W., et al. 2013. Size and Distribution of the California Brown Pelican Metapopulation in a Non-Enso Year, at 4.

The Coastal Pelagic Species Management Plan (CPSMP) will continue to ensure that adequate forage is available to pelicans if economic conditions change and northern anchovies become more intensively fished. The CPSFMP will also ensure that other forage fishes used by pelicans, such as Pacific sardines and Pacific mackerel, are also managed to preserve adequate forage reserves…food supplies are assured by the CPSFMP.[17]

Clearly, the U.S. Department of the Interior, acting through the U.S. Fish and Wildlife Service, expects NMFS and the Council to ensure the adequacy of the forage needs of brown pelicans via maintaining stocks of sardine and anchovy.

- Common Murre

In Fall 2015, an unprecedented die-off of primarily young-of-the-year common murres occurred along the Pacific Coast, resulting in beached bird rates 6-28 times higher than normal.[21] Northern anchovy typically represents at least 10% of the adult diet and (along with Pacific sardine) 53% of the chick diet.[22] Limited prey abundance or availability is believed to have been the primary cause of the event, although domoic acid exposure and increased murre population size may have been contributing factors as well.[23]

- Ano Nuevo Island

Biologists at Oikonos Ecosytem Knowledge have studied Rhinoceros Auklet diet at Año Nuevo Island in central California since 1993. Their studies clearly show that anchovy is the most important prey for the species at this colony, making up 100% of chick diet in some years.[24]

- Farallon Islands

Data collected at the Farallon Islands National Wildlife Refuge by Point Blue Conservation Science show that northern anchovy has historically been a very important component of diet for many seabirds at this global Important Bird Area including common murre, Brandt's cormorant, rhinoceros auklet and western gull. Prey consumption models suggest that Farallon seabirds alone can consume over 90,000 tons of anchovy per year. However, between 2009 and 2014, reflecting the collapse in stocks, anchovies were virtually absent from seabird diet. While some seabirds were able to partially compensate for this loss by switching to alternate prey, other species such as Brandt's cormorants and western gulls suffered extremely low breeding success and population declines.[25]

- California Least Tern

Research undertaken by Point Blue Conservation Science supports the hypothesis that occurrence of important prey for California least terns has decreased near colonies in the Southern California Bight (SCB), and this has negatively affected these colonies and driven down statewide breeding success. The California Least Tern was listed as a federally endangered sub-species in 1970. 87% of the breeding

[21] Gibble, C., K. Lindquist, R. Duerr, J. Lindsey, B. Bodenstein, R. Kudela, L. Henkel, J. Roletto, J. Lankton, J. Harvey. 2016. Investigation of a large-scale common murre (Uria aalge) mortality event in California in 2015. Pacific Seabird Group Annual Meeting, Oahu, HI. Poster.

[22] Roth, J.E., N. Nur, P. Warzybok, and W.J. Sydeman. 2008. Annual prey consumption of a dominant seabird, the common murre, in the California Current system. ICES *Journal of Marine Science* 65:1046-1056.

[23] Gibble et al. 2016.

[24] Carle, R. et al. 2014. Ano Nuevo State Park. Seabird Conservation and Habitat Restoration: Report 2014.

[25] Warzybok P. 2016. Personal communication.

population of ~4205 total pairs occurs in colonies in the southern California Bight. Therefore, breeding success at colonies south of Pt Conception is the primary driver of breeding success statewide. [26]The optimal foraging range of terns provisioning young is ~3.2 km and they bring a "single bill load" (one fish) back to the colony at a time.[27] Thus, they are highly dependent on fish close to the breeding colony while rearing chicks. In central California, least tern productivity is significantly correlated with the presence of young-of-the-year (YOY) rockfish and age 1 anchovy in the diet (Figure 1). While there are fewer data available for southern California, the predominant species are similar to those found in central California diets (namely YOY rockfish, age 1 anchovy, and silverside smelt). An increase in diet diversity since 2000 indicates that least terns in southern California are relying more on alternative prey sources, including larval fish which are likely too small to effectively provision developing chicks.[28] Additionally, a recent study by scientists at Scripps Institute of Oceanography has shown a 72-78% decrease in southern California fishes associated with cooler water (e.g., anchovies and rockfishes) between the 1970s and 2000s.[29] Since 2001, overall productivity at least tern colonies south of Pt Conception has been well below the long term mean. This indicates that least terns are having difficulty locating preferred prey, and that preferred prey including anchovies have likely become less abundant and/or more dispersed within the SCB.[30]

4. Consider the use of seabirds as indicators in a multi-variate approach to understand CSNA stock condition

We applaud Council and NMFS action to move forward with methodology review and integrated stock assessment that will establish an ecosystem based management framework for CSNA. Seabirds can be important indicators in a multivariate approach to understand anchovy stock attributes such as year class strength. In northern California, at the southeast Farallon Islands, and at Ano Nuevo island, time series reaching back to the early 1970's exist for some species.[31] The information that is collected includes anchovy percent occurrence in seabird diet, and the weight, and size/frequency distributions of anchovy delivered to chicks. Field et al. (2007) and Mills et al. (2007) provide examples for using seabird and sea lion prey studies to inform shortbelly rockfish population modeling, and rockfish stock assessment, respectively.[32,33]

In summary we request the Council and NMFS take immediate action to set management reference points for the 2018 CSNA fishing season commiserate with the best available information on stock biomass, and, to move forward with an integrated stock assessment that will establish an ecosystem based management framework for CSNA. These actions will help to protect birds, other predators and fishing communities.

[26] Robinette, D. et al. 2017. Recent Changes in Diet and Breeding Productivity for California Least Terns Breeding in Southern California. Point Blue Conservation Science.
[27] Robinette, D. 2017. Pers. Comm.
[28] Robinette, D. et al. 2017.
[29] Koslow, Miller, and McGowan, Marine Ecology Progress Series 538: 221-227
[30] Robinette, D. et al. 2017.
[31] Warzybok, P. 2017. Personal Communication.
[32] Field. J. E. Dick and A. MacCall. 2007. Stock assessment for model for the shortbelly rockfish, Sebastes jordani, in the California Current. NOAA-TM-NMFS-SWFSC-405
[33] Mills, K. L., S. Ralston, T. Laidig, and W. J. Sydeman. 2007. Diets of top predators indicate pelagic juvenile rockfish (Sebastes spp.) abundance in the California Current System. Fish. Oceanogr. 16:273–283.

Sincerely,

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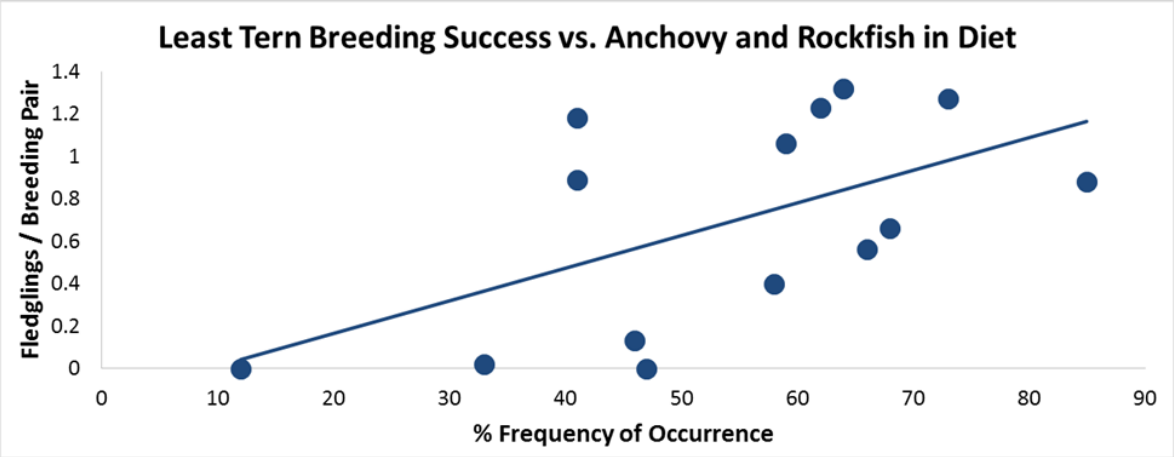

Figure 1. Significant relationship of least tern productivity with the presence of young-of-the-year (YOY) rockfish and age 1 anchovy in the diet in Central California. Figure provided by D. Robinette. Point Blue Conservation Science, 2017.