



June 3, 2015

Dorothy Lowman, Chair  
Pacific Fishery Management Council  
1100 NE Ambassador Place, Suite 101  
Portland, OR 97220

**RE: Agenda Item G.3 – Anchovy Update**

Dear Chair Lowman and Council Members:

We write with respect to the Anchovy Update that the Pacific Fishery Management Council (Council) will receive at its June 2015 meeting. As part of this agenda item, we reiterate our previous request that the Council and the National Oceanic and Atmospheric Administration's Fisheries Service (NOAA Fisheries) prioritize a full stock assessment for both the northern and central subpopulations of northern anchovy. We ask that this assessment be initiated prior to the end of 2015, and that the Council utilize the resulting information, along with data on California Current Ecosystem (CCE) predator/prey dynamics, to develop an ecosystem-based management framework for northern anchovy. With recent data pointing to low anchovy abundance, we also request that as an interim safeguard, the Council establish an Annual Catch Target (ACT) of 7,000 metric tons (mt) for the central subpopulation to more accurately reflect current stock status and the role of northern anchovy in the ecosystem.

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 sea birds.<sup>1</sup> In fact, according to diet studies of 32 different marine predators conducted over multiple regions and multiple years, anchovy is the most important forage fish throughout the CCE.<sup>2</sup>

Despite northern anchovy's critical role as forage for dependent predators, information on the status of both subpopulations is outdated and highly uncertain. What data is available suggest the stock may be at very low levels. Declining survey trends, coupled with the potential for increased fishing effort following the closure of the Pacific sardine fishery, underscore the urgent need to focus more attention on data collection, assessment, and management of northern anchovy.

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<sup>1</sup> Pacific Fishery Management Council. July 2013. [Ecosystem Initiatives Appendix to the Pacific Coast Fishery Ecosystem Plan](#), page A-11.

<sup>2</sup> Ainley, D. et al. 2015. California current system – predators and the preyscape. *Journal of Marine Systems* 146: 1-2.

Specifically, we request that the Council:

- Request that NOAA Fisheries initiate a stock assessment for both subpopulations of northern anchovy by the end of 2015, to be completed in 2016.
- Utilize this new stock assessment and associated modeling data to develop a long-term strategy for sustainably managing the northern anchovy fishery, including an ecosystem-based harvest control rule.
- Until an updated and ecosystem-based control rule is in place, adopt an ACT of 7,000 mt for the central subpopulation of northern anchovy in response to concerns over stock size, predator needs, and fishing effort.
- Request that the Council's Scientific and Statistical Committee (SSC) review a forthcoming abundance estimate of northern anchovy being conducted by scientists from the Farallon Institute.

Below we discuss these recommendations in more detail.

### **Initiate a stock assessment for northern anchovy**

In order to manage northern anchovy with a higher degree of certainty, the Council must obtain sufficient information on both stock status and ecosystem role. Currently, there is no reliable information on the abundance of either the northern or central subpopulation of northern anchovy. The biomass estimate for the northern subpopulation is based on outdated and insufficient information, while the central subpopulation was last assessed in 1995.

The few data points that we can look to only compound the uncertainty surrounding the status of northern anchovy. Recent survey cruises conducted by the Southwest Fishery Science Center have detected declining numbers of northern anchovy eggs (including a complete absence of eggs during the Spring 2013 survey)<sup>3</sup>, suggesting a downward trend in abundance. In particular, one of the major findings for the Southern California Current in the 2013 Integrated Ecosystem Assessment, based on CalCOFI abundance surveys, was that “larval anchovy abundance continued a declining trend over the last thirty years to the lowest abundance since 1951.”<sup>4</sup> This pattern of anchovy decline was also evident in rockfish recruitment surveys through 2014, as presented in the latest “State of the California Current” CalCOFI Report.<sup>5</sup> (See Appendix to this letter containing multiple indices of recent anchovy abundance.)

Meanwhile, landings of northern anchovy have fluctuated between roughly 2,000 and 20,000 mt over the last 15 years, with coastwide catch exceeding 10,500 mt in 2014 – the highest level since 2008.<sup>6</sup> More recently, year-to-date landings in 2015 have already surpassed 7,600 mt in

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<sup>3</sup> NOAA Fisheries, Southwest Fishery Science Center, [Continuous Underway Fish Egg Sampler Distribution Maps for Sardine, Anchovy, and Jack Mackerel](#)

<sup>4</sup> Wells, B. K. et al. 2013. [CCIEA Phase III Report 2013: Ecosystem Components, Fisheries – Coastal Pelagic and Forage Fishes](#), page C-12.

<sup>5</sup> Leising, A. W. et al. 2014. State of the California Current 2013-14: El Nino Looming. [CalCOFI Rep., Vol 55](#), Figure 22.

<sup>6</sup> PacFIN. March 18, 2015. Pacific States Marine Fisheries Commission. [Washington, Oregon, and California All Species Report 307](#)

California alone.<sup>7</sup> We note that these levels of catch exceed the maximum catch allowed under the Northern Anchovy Fishery Management Plan (prior to Amendment 8 and its transition to the Coastal Pelagic Species Fishery Management Plan) of 7,000 mt when the stock was below 300,000 mt.

These trends, coupled with a paucity of reliable and current information on this keystone forage species, demonstrate an urgent need for an updated anchovy assessment. The potential for increased fishing effort on northern anchovy stemming from the closure of the 2015-2016 Pacific sardine fishery further amplifies this need. Consequently, we ask that the Council and NOAA Fisheries expedite an assessment of both the northern and central subpopulations of northern anchovy. We appreciate that the Council has recently discussed the importance of an updated assessment, and that NOAA Fisheries has indicated it intends to begin work on this effort by 2016.<sup>8</sup> However, given the collapsed condition of the Pacific sardine population and the potential for ripple effects from a suspension of directed fishing, we request that a northern anchovy stock assessment be initiated prior to the end of this year.

Having current and reliable information on northern anchovy will allow the Council to act with greater certainty in setting catch levels that provide for sustainable fishing activity as well as for the maintenance of adequate forage for marine wildlife, a key objective of the Coastal Pelagic Species (CPS) Fishery Management Plan (FMP).<sup>9</sup> This information will also advance the transition to ecosystem-based fishery management by providing resource managers with a clearer picture on coastal pelagic species abundance, forage availability, food web dynamics, and ultimately how our West Coast fisheries impact and are impacted by marine ecosystems.

To this end, a full and updated stock assessment is a necessary first step toward focusing increased management and science attention on both subpopulations of northern anchovy. Once completed, this assessment should be utilized to develop a long-term strategy for sustainably managing the northern anchovy fishery, including adoption of an ecosystem-based harvest control rule that reflects current biological and socio-economic conditions.

A recent settlement agreement regarding Amendment 13 to the CPS FMP requires that NOAA Fisheries compile and examine scientific information pertaining to Minimum Stock Size Thresholds (MSST) for both subpopulations of northern anchovy, and develop recommendations and a report to the Council by September 2016.<sup>10</sup> While this must be done regardless of an updated anchovy assessment, such an assessment would provide more reliable data for determining MSST values that meet National Standard 1 guidelines.<sup>11</sup>

In sum, 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

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<sup>7</sup> California Department of Fish and Wildlife. June 2, 2015. [2015 Coastal Pelagic Species Landings Summary](#)

<sup>8</sup> NOAA Fisheries. November 2013. PFMC Agenda Item E.I.c, [Supplemental Southwest Fisheries Science Center PowerPoint](#)

<sup>9</sup> PFMC. September 2011. [Coastal Pelagic Species Fishery Management Plan](#) as amended through Amendment 13, page 12.

<sup>10</sup> *Oceana v. Pritzker*, No. 13-16183 (9<sup>th</sup> Cir. 2015) (dismissing appeal pursuant to Settlement Agreement).

<sup>11</sup> 50 C.F.R. § 600.310(e)(2)(ii)(B).

anchovy and its relationship to Pacific sardine; better manage the entire CPS assemblage; maintain the role of northern anchovy in the ecosystem; and ultimately manage all of the Council's fisheries with an ecosystem-based approach.

**In the near term, adopt an ACT of 7,000 mt for the central subpopulation of northern anchovy**

Until a new stock assessment can be completed and an ecosystem-based harvest control rule is in place, we ask that the Council adopt an ACT of 7,000 mt for the central subpopulation of northern anchovy. The CPS FMP, which was originally the Northern Anchovy FMP, once contained a broader set of management measures for northern anchovy, including a harvest control rule with a CUTOFF value of 300,000 mt, below which the catch level was capped at 7,000 mt (provided the stock was above the MSST of 50,000 mt).<sup>12</sup> This harvest protocol was designed so that fishing only occurred at high levels of abundance, consistent with the explicit goal of ensuring a forage reserve for marine predators. In fact, the reproductive success of brown pelicans was among the performance metrics used to evaluate harvest control rules and ultimately justify the control rule selected in the Northern Anchovy FMP. The current management measures for northern anchovy do not include any of these important elements.

In the absence of updated information about or active management of the central subpopulation, we request that the Council adopt an ACT that adheres to its most recent understanding of what constitutes an appropriate landings cap. Adding a biological reference point in the form of an interim ACT to the current management benchmarks for northern anchovy would improve the likelihood that a forage reserve is maintained, especially given recent egg and acoustic survey information indicating low stock biomass.

Establishing an ACT below the existing Annual Catch Limit (ACL) will also allow the Council to act with a level of precaution commensurate with the degree of uncertainty surrounding current stock size. According to recent Council documents, the central subpopulation is assumed to be roughly 410,000 mt but as discussed above, this assumption is based largely on information from more than 20 years ago and does not reflect recent survey data suggesting a downward trend in abundance. A key aspect of CPS management widely acknowledged by the Council is that these stocks undergo large natural fluctuations in abundance; the use of outdated information or historic averages therefore fails to account for periods of low natural abundance, such as the one we are likely presently experiencing.

Consequently, the current status determination criteria and biological reference points for northern anchovy's central subpopulation cannot be shown with confidence to meet the forage needs of dependent predators. Recent landings data for the central subpopulation may be cause for additional concern. As described above, landings in 2014 were at their highest level since 2008; this year, landings at Monterey Bay ports have increased over the last several weeks, with the total as of June 2 at more than 7,600 mt.<sup>13</sup> For weeks where data is available, weekly landings of anchovy in California from January 1 to April 28 ranged between 141 and 962 mt,

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<sup>12</sup> PFMC. November 1990. Sixth Amendment to the Northern Anchovy Fishery Management Plan.

<sup>13</sup> California Department of Fish and Wildlife. June 2, 2015. [2015 Coastal Pelagic Species Landings Summary](#)

with daily landings occasionally exceeding 100 mt (due to confidentiality limitations, data is only available for weeks during which three or more vessels made landings).<sup>14</sup>

As this year's landings may be on the rise, we note that anchovy, like many forage species, are especially vulnerable to fishing pressure at lower levels of abundance. Because northern anchovy travel in schools that can be more easily caught, landings could continue to increase despite low abundance, a dynamic that has the potential to both mask and exacerbate population declines.<sup>15</sup>

Absent a more comprehensive understanding of the status of anchovy, the adoption of an interim ACT of 7,000 mt would allow the Council to better meet at least two key goals of its CPS FMP: to provide adequate forage for dependent species and to prevent overfishing in light of the stock potentially being at very low relative levels.<sup>16</sup> Further, adopting an ACT for the central subpopulation of northern anchovy comports with Council guidance, which holds that, "Along with optimum yield (OY) considerations, an HG [Harvest Guideline] or ACT may be utilized below an ACL or sector-specific ACL to account for management uncertainty..."<sup>17</sup> An interim ACT of 7,000 mt would help buffer against the significant uncertainty associated with this data-poor stock.

### **Request SSC review of a forthcoming abundance estimate of northern anchovy**

Scientists affiliated with the Farallon Institute, led by Dr. Alec MacCall, are currently working on an abundance estimate for the central subpopulation of northern anchovy. The estimate is anticipated to be completed this summer and will be based on the strong positive relationship between fish abundance during their egg and larval stages and abundance of spawning adults. The analysis's main objectives are to develop appropriate time- and area-weighted abundance indices based on CalCOFI net samples; use regression models to develop correlations of larval indices against historical biomass estimates; compare the new index to the one recent biomass estimate; and recommend approaches for sampling and analysis to enhance full stock assessments in the future.

We believe this abundance estimate will represent the best available scientific information on stock status and provide a more reliable basis for anchovy management. To that end, we ask that the Council request a review of the estimate by the SSC, such that the SSC can provide any appropriate recommendations in response and include an evaluation as part of its report to the Council at either the September or November 2015 meeting. It is our hope that SSC review of the Farallon Institute's abundance estimate will augment and enhance the Council's discussion of the anchovy assessment white paper agenda item scheduled for the November meeting.

Each of the above requests is underpinned by the vital significance of northern anchovy to the CCE and its predators, and a corresponding need to take an ecosystem-based approach to

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<sup>14</sup> Protasio, Chelsea. May 2015. California Department of Fish and Wildlife.

<sup>15</sup> Pikitch, E. et al. 2012. Little Fish, Big Impact: Managing a crucial link in ocean food webs. Lenfest Ocean Program. Washington, DC.

<sup>16</sup> PFMC. September 2011. [Coastal Pelagic Species Fishery Management Plan](#) as amended through Amendment 13, page 12.

<sup>17</sup> PFMC. December 2014. [Status of the Pacific Coast Coastal Pelagic Species Fishery and Recommended Acceptable Biological Catches](#), page 28.

management of northern anchovy and the rest of the CPS assemblage. According to two separate and complementary new analyses, anchovy is the single most important prey species for California Current seabirds,<sup>18</sup> and the first or second most important for the broader suite of predators, such as humpback whales, chinook salmon, dolphins, and pinnipeds.<sup>19</sup> Numerous seabirds including California brown pelican; shorttailed, sooty, Buller's, flesh-footed, pink-footed, and black-vented shearwaters;<sup>20, 21, 22</sup> common murre; rhinoceros auklet; Craveri's murrelet; Scripps's murrelet; and California least tern rely on anchovy for one or more seasons of the year.<sup>23</sup> Recently published analyses of seabird and forage fish distribution and abundance in the CCE show that a substantial decline in seabird abundance in the northern portion of the southern CCE (from around Point Conception, California, northward) – a rate of decline of 2.2% per annum from 1987-2011 – is attributable to declines in anchovy abundance and availability.<sup>24</sup>

California brown pelicans are particularly dependent on abundance and availability of anchovies in close proximity to colonies during their pre-breeding and breeding periods.<sup>25, 26</sup> Anchovies comprised 33% -100% of the diets of breeding pelicans in six years of surveys that took place at the U.S. Channel Islands between 1991 and 2005, including two years where anchovies comprised 100% of the diet.<sup>27</sup> Since 2010, biologists have noted a general decline in California brown pelican reproductive success, culminating in a near-total nesting failure in 2012 and 2013. In 2014, biologists reported the first-ever range-wide breeding failure of brown pelicans, from the Gulf of California through the U.S. Channel Islands.<sup>28</sup> At the Channel Islands, biologists analyzed a range of possible causes, including contaminants, disease, and disturbance effects, and concluded that local prey availability during the breeding season is most likely the primary cause of these reproductive failures.<sup>29</sup>

These recent breeding failures serve as a stark indication of the need to focus greater management and science attention on northern anchovy. When the U.S. Fish and Wildlife Service removed brown pelicans from Endangered Species Act protection in 2009, it based its

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<sup>18</sup> Szoboszlai, A.I. et al. (In Revision) Forage species in predator diets: Synthesis of data from the California Current. Ecological Informatics.

<sup>19</sup> Ainley, D. et al. 2014. Towards ecosystem based-fishery management in the California Current System – Predators and the preyscape: a workshop. Unpublished report to the National Fish and Wildlife Foundation. Point Blue Conservation Science, Petaluma, California. Point Blue contribution number 1979.

<sup>20</sup> Lyday, S. et al. 2013. [Shearwaters as ecological indicators: towards predicting fish catch in the California Current](#)

<sup>21</sup> Szoboszlai, A.I. et al. Ibid.

<sup>22</sup> 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.

<sup>23</sup> 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 temperature *Can. J. Fish. Aquat. Sci.* 65: 1610–1622.

<sup>24</sup> Sydeman, W. et al. 2015. [Climate-ecosystem change off southern California: Time-dependent seabird predator-prey numerical responses](#). *Deep-Sea Research II* 112:158-170.

<sup>25</sup> Anderson, D. et al. 1980. Brown pelicans as anchovy stock indicators and their relationships to commercial fishing. *CalCOFI Rep.*, Vol. XXI, 1980.

<sup>26</sup> Anderson, D. et al. 1982. Brown pelicans: influence of food supply on reproduction. *OIKOS* 39: 23-31.

<sup>27</sup> Harvey, L. March 2013. California Brown Pelican reproductive decline on the Channel Islands colonies. California Institute of Environmental Studies. Unpublished data.

<sup>28</sup> Preliminary data presented by Dan Anderson (Mexico) and Laurie Harvey (Channel Islands) at phone meeting of the Pacific Brown Pelican Rangewide Technical Working Group. May 2014. Convened by USFWS Region 8. Carlsbad, CA.

<sup>29</sup> Harvey, L. 2013. Ibid.



decision to do so in part on the assumption that the CPS FMP would ensure a forage reserve for brown pelicans.<sup>30</sup> Yet from an ecosystem perspective, the Council cannot truly accomplish the CPS FMP's objective of maintaining adequate forage for dependent predators without having sufficient knowledge on the abundance and status of northern anchovy. Until that information is available and can be applied to management of northern anchovy, an ecosystem-based approach calls for managers to act with a high level of precaution, as we are requesting here. The increased recognition that fishing can amplify natural stock declines in forage species, combined with recent indicators of low anchovy biomass in the CCE, further highlight the need for both precaution and management attention.

To this end, we also support the U.S. Fish and Wildlife Service's request that the Council consider the information provided by the Service regarding recent California brown pelican mortality events and breeding failures and evaluate whether additional management measures are needed to ensure that an adequate forage reserve of northern anchovy is maintained over the long term for brown pelicans and other marine predators in the CCE.<sup>31</sup>

### **Conclusion**

In conclusion, we ask that the Council prioritize a new stock assessment for both subpopulations of northern anchovy and utilize the resulting information to develop an ecosystem-based management framework for the species. In the interim, we request that the Council adopt an ACT of 7,000 mt due to concerns over stock size, increased landings, and predator needs. Finally, we ask that the Council seek the SSC's review of a forthcoming abundance estimate of the central subpopulation of northern anchovy to help further inform the Council's broader discussion of assessment methodology and planning.

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

Sincerely,



Anna Weinstein  
Marine Program Director  
Audubon California



Andrea Treece  
Staff Attorney  
Earthjustice

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<sup>30</sup> Federal Register / Vol. 74, No. 220 / Tuesday, November 17, 2009 / Rules and Regulations. 50 CFR 17 Endangered and Threatened Wildlife and Plants; Removal of the Brown Pelican (*Pelecanus occidentalis*) From the Federal List of Endangered and Threatened Wildlife, Final Rule.

<sup>31</sup> U.S. Fish and Wildlife Service. May 2015. [Report to Pacific Fishery Management Council re: Agenda Item G.3.a for June 2015 Council Meeting](#)



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## Appendix: Available Data from Survey Indices of Northern Anchovy Abundance

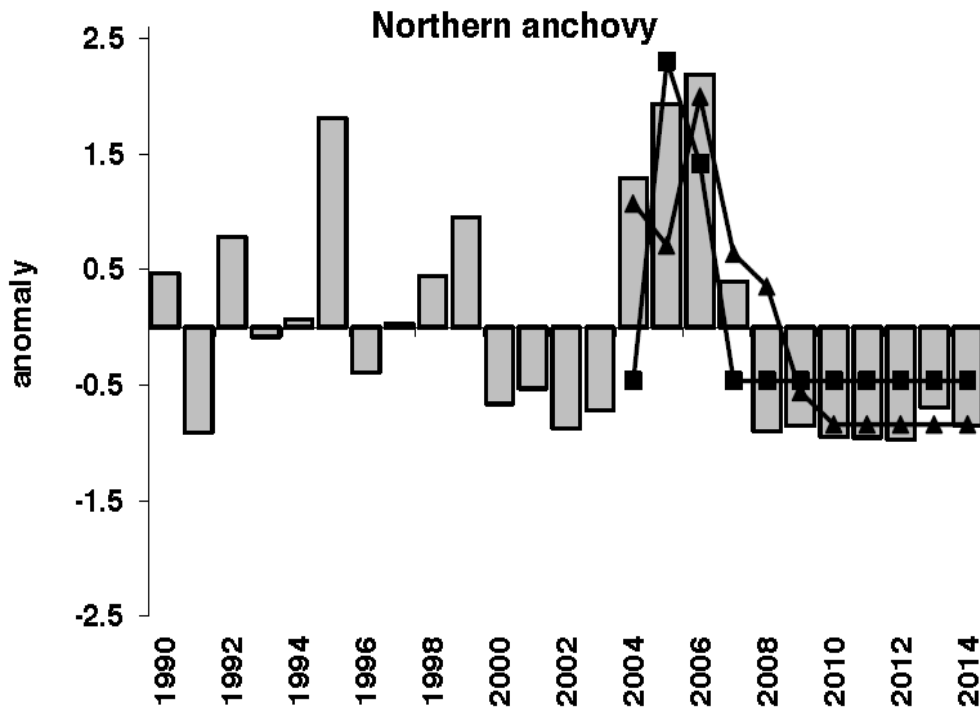
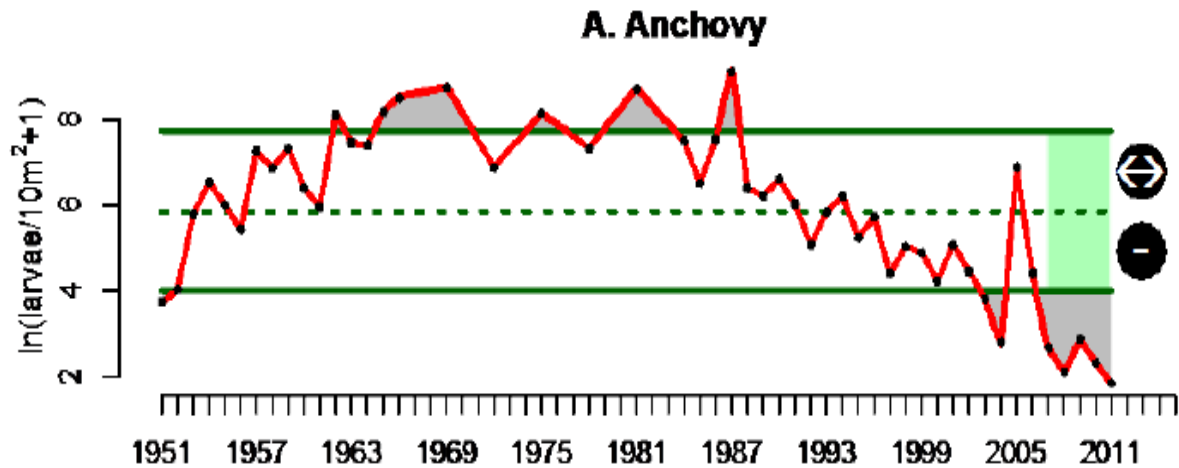


Figure 22. Long-term standardized anomalies of several of the most frequently encountered pelagic forage species from rockfish recruitment survey in the core (central California) region (1990-2014) and the southern and northern California survey areas (2004-14, excluding 2012 for the northern area).

From Leising, A. W. et al. 2014. State of the California Current 2013-14: El Nino Looming. [CalCOFI Rep., Vol 55: 51-87](#), Figure 22.



**Figure C2.** *Southern California Forage, CalCOFI.* Most time series are plotted in a standard format. Dark green horizontal lines show the mean (dotted) and  $\pm 1.0$  s.d. (solid line) of the full time series. The shaded green area is the last 5-years of the time series, which is analyzed to produce the symbols to the right of the plot. The upper symbol indicates whether the trend over the last 5-years increased, or decreased by more than 1.0 s.d. , or was within one 1.0 s.d of the long-term trend. The low symbol indicates whether the mean of the last 5 years was greater than (+), less than (-) or within (·) one s.d. of the long-term mean.

From Wells, B. K. et al. 2013. [CCIEA Phase III Report 2013: Ecosystem Components, Fisheries – Coastal Pelagic and Forage Fishes](#), Figure C2 (A).

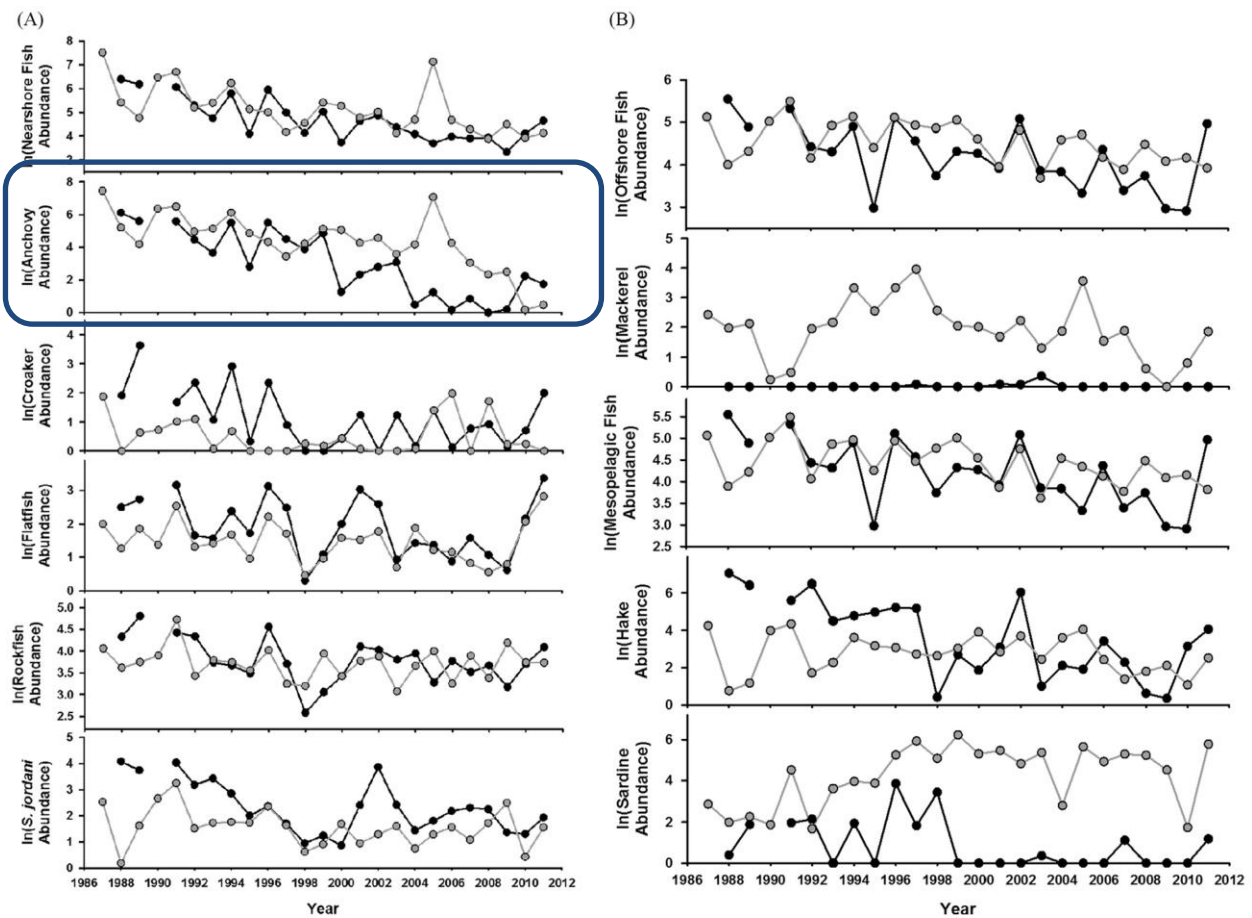


Fig. 4. Interannual variability in abundance of larval fish ( $\ln(\text{No. } m^{-2})$ , 1987–2011: (A) nearshore fish group and species (flatfish, anchovy, croakers, rockfish, and *S. jordani*) and (B) offshore fish group and species (jack mackerel and mesopelagic fish), as well as hake and sardine, which were not grouped into either the nearshore or offshore fish categories. Black= winter and gray=spring.

From Sydeman, W. et al. 2015. [Climate-ecosystem change off southern California: Time-dependent seabird predator-prey numerical responses](#). Deep Sea Research II: 112:158-170, Figure 4.