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Skyli McAfee, Executive Director
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1330 Broadway, Suite 1530
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VIA ELECTRONIC MAIL

Re: Ocean Protection Council Science Advisory Team Workshop: Exploring Ocean Health as a Scientific Concept and Management Goal (June 11, 2014)

Dear Ms. McAfee:

Earth Law Center welcomes the above-described OPC Science Advisory Team discussion on ocean health, and is pleased to offer these initial comments for the June 11th workshop. Earth Law Center is a 501(c)(3) non-profit that advances legal rights for ecosystems and species to be healthy, thrive and evolve. This mission necessitates an understanding of ecosystem “health,” an integrated, holistic analysis that spans existing, media-specific environmental laws. The scientific discussion around the concept of ocean “health” will help daylight gaps and limitations in ocean and coastal law and governance, which in turn can be strengthened to put us on a path toward overall, intrinsic ocean well-being.

Ocean “Health” Is a State Goal

The California Ocean Protection Act (COPA) specifically addresses “health,” articulating that state decisions affecting coastal waters and the ocean environment “should be designed and implemented to conserve the health and diversity of ocean life and ecosystems”¹ and “conducted in a manner consistent with protection, conservation, and maintenance of healthy coastal and ocean ecosystems”² COPA further finds that “[a] healthy ocean is part of the state’s legacy, and is necessary to support the state’s human and wildlife populations.”³

More particularly, ocean “health” is important to assessing Marine Life Protection Act (MLPA) success. The MLPA reaches past the immediate boundaries of designated marine protected areas to advance protection of the ocean and coast generally, aiming (among other goals) for ocean ecosystem health. For example, Fish and Game Code Sec. 2853(b)(1) notes that the goals of MLPA include “protect[ing] the natural diversity and abundance of marine life, and the structure,

¹ Public Resources Code § 35510(b)(1).

² Public Resources Code § 35510(b)(5).

³ Public Resources Code § 35505(a).

function, and integrity of marine ecosystems”; the MLPA Master Plan interprets this goal as emphasizing the “health of marine ecosystems.”⁴

Further, the MLPA specifically recognizes the value of protecting representative and unique marine habitats for their own “intrinsic value.”⁵ This indicates, importantly, that “health” in the MLPA context refers to “health” from the perspective of the affected ecosystems, as opposed to an anthropocentric definition of health.

California Does Not Have a Consistent Definition of Ocean “Health”

Currently, we receive mixed messages about ocean “health” due to the lack of a consistent definition of the concept. For example, the 2012 CEA Report states that the California Current Ecosystem (CCS) is in “relatively” good shape; that is, it is doing better than other marine systems around the country for which people have been around longer and caused more sustained damage.⁶ This, however, does not mean the system is doing *well*. Comparative well-being nationwide is irrelevant to the particular ecosystems and species off our coast; actual well-being in the context of the system being examined is more meaningful, particularly with respect to tracking how well regulatory activities are achieving their intended goals. To this end, the CEA Report also observes that the CCS is at the “35-45% level,” a “2.5 on scale of 1-5,” “depleted,” and likely not in “good shape.” However, these are reported expert observations; by contrast, U.S. EPA has observed that there is “little understanding of the ‘health’ or integrity of the nation’s ecological systems,”⁷ and more work is needed.

Defining “Ocean Health” Is Necessary to Successful Implementation of Ecosystem-Based Governance

COPA and the OPC arose in large part from the efforts of the Pew Oceans Commission and the U.S. Commission on Ocean Policy to address ongoing ocean degradation. Both of these Commissions emphasized the importance of modernizing governance to reflect natural systems, including the interconnections of land and sea. In particular, both Commissions found that:

National ocean policy and governance must be realigned to reflect and apply principles of *ecosystem health* and integrity, sustainability, and precaution. We must redefine our relationship with the ocean to reflect an understanding of the land-sea connection and *organize institutions and forums capable of managing on an ecosystem basis.*⁸

⁴ CA DFG, “Master Plan for Marine Protected Areas,” pp. iii, 12 (Jan. 2008); available at: <http://www.dfg.ca.gov/marine/pdfs/revisedmp0108.pdf>.

⁵ Fish and Game Code Sec. 2853(b)(4).

⁶ California Environmental Associates, “California Current Ecosystem Assessment: Summary of current condition, pressures, and opportunities for the conservation community – January-July 2012,” pp. 17-20 (2012), available at: <http://www.ceiconsulting.com/CaseStudyFiles/California%20Current%20Ecosystem%20Assessment%20-%20Summary%20Findings.pdf> (CEA Report).

⁷ U.S. EPA, “A Framework for Assessing and Reporting on Ecological Condition,” p. 1 (June 2002), available at: [http://yosemite.epa.gov/sab/sabproduct.nsf/7700D7673673CE83852570CA0075458A/\\$File/epec02009.pdf](http://yosemite.epa.gov/sab/sabproduct.nsf/7700D7673673CE83852570CA0075458A/$File/epec02009.pdf).

⁸ Pew Oceans Commission, *America’s Living Oceans: Charting a Course for Sea Change*, Executive Summary, p. x (May 2003), available at:

http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Protecting_ocean_life/env_pew_oceans_final_report_summary.pdf (emphasis added); see also U.S. Commission on Ocean Policy, *An Ocean Blueprint for the 21st Century*, p. 4 (Washington D.C. 2004), available at: http://jointoceancommission.org/documents/USCOP_report.pdf (envisioning

The Commissions each recognized that *ecosystem health* requires integrated institutional systems designed on an *ecosystem basis* – that is, institutions designed to reflect the nature of actual ecosystems. The flaws inherent in our current, media-specific governance structures will begin to make themselves known as soon as we begin the discussion of ocean health, which necessarily reaches beyond current institutional guardrails. This discussion should span land and sea, since inland activities regularly impact ocean and coastal well-being.⁹

Accordingly, efficient and effective governance calls for a science-based determination of what a “healthy” ocean and coastal ecosystem looks like. This is different and distinct from current regulatory proxies for “health,” which are (in effect) represented by our progress in implementing a range of activities that could potentially lead us *toward* health. While this strategy has had some success in avoiding further degradation, it will prove insufficient to secure ecosystem well-being. The goal instead should be to modernize our assessment frame, from “how is the environment degrading in light of a lowest-common-denominator standard” (the current approach under most existing environmental laws) to “how is the environment improving toward a vision of system health,” where “health” is defined based on an integrated suite of appropriate indicators. By taking on this task, we will find ourselves changing the programs we adopt, the coordination we undertake, the activities we conduct, the metrics we use to assess progress, and the results we achieve.

Defining Ocean “Health” Is Possible

As noted in the CEA Report,¹⁰ concerns may be raised with regard to the state’s ability to create a science-grounded definition of “ocean health,” particularly in light of the variability in ocean ecosystems. Two responses can initially be made to these concerns. First, with regard to potential challenges posed by geographic disparity among coastal and marine systems, different determinations (or categories of determinations) of “healthy” could be made depending on location, habitats and species at issue.

Second, as to the broader issue of whether this is possible, the most immediate observation is that we *already* make decisions based on scientific assessments of environmental well-being – but from the perspective of degradation, not health. For example, the Clean Water Act sets standards below which waterways are considered degraded; it does not set a standards bar that indicates waterway “health.” Monitoring and assessment is tracked and reported on based on a degradation, not improvement, framework. Degraded waters are identified, listed and tracked, but healthy waters are virtually ignored. This may have been an opportune initial strategy in the early 1970s, when many of the nation’s waterways suffered from a lack of meaningful sewage treatment facilities and were forced to absorb relatively free-flowing industrial waste. However, the challenges we face today reflect chronic, rather than acute, human misbehavior, and require a different approach.

In another example, the Endangered Species Act results in science-based recommendations

a future in which “[m]anagement boundaries correspond with ecosystem regions, and policies consider interactions among all ecosystem components”).

⁹ See, e.g., Fish and Game Code Sec. 2851(c) (“Coastal development, water pollution, and other human activities threaten the health of marine habitat and the biological diversity found in California’s ocean waters”).

¹⁰ CEA Report at 14 (quoting interviewees’ stated concerns about defining “health,” such as “[u]sing the term health causes ecologists a great deal of heartburn”).

on whether species are “threatened” and on the habitat and other needs of such species to become “not threatened.” Like the Clean Water Act, it does not set standards based on what “healthy” might look like.

Because our regulatory structures are grounded in “less degradation,” degradation is inevitable. If we envision achieving ocean health, we will shift our governance, activity and assessment structures to reach that loftier goal. We must set our science and policy frameworks accordingly.

Existing Efforts to Define Healthy Systems Can Provide Guidance

Efforts to assess ecosystem “health” from its own perspective (*i.e.*, apart from its utility to humans) have already begun and could be turned to initially for guidance. For example, one of the goals of the California and U.S. EPA collaborative “Healthy Watershed Initiative”¹¹ is to use science (primarily science team members from the state’s “Healthy Streams Partnership”)¹² to holistically identify “healthy watersheds” and then develop stewardship strategies to keep them healthy.¹³ The factors being developed to inform the selection of “healthy” watersheds could be used to help inform the goal of more generally defining “health.” This new goal could then serve as the vision for waterways/watersheds that are still struggling and as the metric(s) against which the effectiveness of specific policy and restoration programs are assessed. COPA’s goal of enhancing restoration of degraded ocean systems would similarly benefit from a clearly defined end goal of “health,” one that could be consistently measured and tracked. This end goal of “health” would rise above funding and other practical constraints that tend to serve as proxies for “task completed.” While such practical constraints may prevent expeditious attainment of “health,” they at least might no longer be conflated with the concept.

More specifically, the task of defining ocean “health” would likely involve the development and adoption of multi-disciplinary indicators or metrics (which could vary based on the type of system), strategies for integrating them into single assessments, and appropriate scales for such metrics (for example, a scoring system from one to 100). Science would serve this vision and policy goal by translating complex biological information into such scores, which must be readily understood by decisionmakers and the public.

The effort could begin with development of partnerships – including through existing entities such as the Ocean Science Trust, the Healthy Watersheds Initiative, the California Water Quality Monitoring Council, the MPA Monitoring Enterprise, and others¹⁴ – whose members could

¹¹ See <http://water.epa.gov/polwaste/nps/watershed/index.cfm>.

¹² See http://www.mywaterquality.ca.gov/monitoring_council/healthy_streams/.

¹³ The Cadmus Group, for U.S. EPA, “California Integrated Assessment of Watershed Health: A Report on the Status and Vulnerability of Watershed Health in California” (Nov. 2013), available at: http://www.mywaterquality.ca.gov/monitoring_council/healthy_streams/docs/ca_hw_report_111213.pdf. In part as a result of this effort, separate pilot projects have begun in the San Diego River Watershed (http://www.mywaterquality.ca.gov/monitoring_council/healthy_streams/docs/sdrw_reportcard.pdf) and along the Central Coast

(http://www.mywaterquality.ca.gov/monitoring_council/healthy_streams/docs/healthywatersheds_krw.pdf) to develop watershed “report cards” that further integrate across multi-media data; these products are forthcoming.

¹⁴ The Governor’s proposed draft 2013 Environmental Goals and Policy Report (EPGR), the first in over three decades, includes as a key goal to “Improve Cross Agency Coordination and Data Availability.” Supporting actions include

start to meet and discuss the science, legal and other challenges to this effort and begin to outline ways in which to surmount them. The development of integrated indicators that identify the overall health of coastal and marine ecosystems should include cumulative and synergistic impacts, and missing but needed data should be identified and a process established for obtaining such data (as per COPA’s call for agency compliance with data requests¹⁵). Application to specific ecosystems on a pilot basis could serve as tests for the initial indicators and scoring systems that would be developed pursuant to this effort. Finally, integrated monitoring and data reporting systems should be developed and tested in order to provide a framework for assessing progress towards “health.”

Example of an Ecosystem-Based Health Assessment: Heal the Bay

As noted above, the MLPA specifically recognizes the value of protecting representative and unique marine habitats for their own “intrinsic value.”¹⁶ As one example of an initiative that seeks to measure ecosystem health from its own perspective, rather than from the ecosystem’s utility to humans, Heal the Bay created a “Stream Health Index” in the Malibu Creek Watershed.¹⁷ As they describe:

Several indices currently exist to measure biological condition, habitat health, and water quality independently, but there is no well-accepted, widely-used metric to measure the combined effects of multiple stressors on watershed health. This report presents a simple Stream Health Index (SHI) using biological, habitat, and water quality data collected by Heal the Bay’s Stream Team since 1998. These parameters are analyzed together to provide a single, integrated value, which reflects the health status of individual monitoring locations in the Malibu Creek Watershed. The SHI is based on a 27 point scale, with water quality, biotic condition, and habitat condition each comprising nine of the points. Even in its basic form, this index could be used in the future to evaluate trends in ecosystem health at specific locations or assess ecosystem response to remedial actions taken to protect and improve watershed health.¹⁸

Their highest scores indicate the desired ecosystem health, and the scoring system is used to track the relative levels of health in various subsystems against that ideal.

“[c]reat[ing] a culture of collaboration through institutional and procedural means,” “[u]s[ing] metrics and indicators to track progress toward meeting statewide and agency-specific Goals,” and “[b]uild[ing] transparent, accessible systems for sharing data across state agencies and with the public.” Governor’s Office of Planning and Research, “California @ 50 Million: California’s Climate Future,” p. 34, available at: http://opr.ca.gov/docs/EGPR_ReviewDraft.pdf. An OPC SAT initiative to define ocean “health” would involve each of these types of actions to significantly leverage existing, siloed data into more the type of more accessible, integrated and effective data products envisioned by the draft EPGR. Such an initiative would also serve to advance the EGPR’s intent to “build resilience in natural systems” by creating a metric that could assess the resilience of the system to pressures such as those associated with climate change, rather than deferring to our own resilience in finding alternatives to increasingly impacted system components. *Id.* at 21.

¹⁵ Public Resources Code § 35620(b).

¹⁶ Fish and Game Code Sec. 2853(b)(4).

¹⁷ Heal the Bay, “Malibu Creek Watershed: System on the Brink,” pp. 21, 124-130, available at: <http://www.healthebay.org/sites/default/files/pdf/Heal%20the%20Bay%20-%20Malibu%20Creek%20Watershed%20Report%20-%20Ecosystem%20on%20the%20Brink.pdf>.

¹⁸ *Id.* at 21, 124.

Example of Human-Focused Ocean Assessment: Ocean Health Index

By contrast with definitions of “health” that focus on the ecosystem’s intrinsic well-being, Conservation International’s (CI) “Ocean Health Index”¹⁹ (OHI) defines a “healthy ocean” as “one that sustainably delivers a range of benefits to people both now and in the future.” It assumes that goals for ocean management reflect “what people want and expect from the ocean,” as opposed to setting management goals that ensure the well-being of the ocean for its own, intrinsic well-being. In other words, ocean “health” under the OHI uses benefits to humans as proxies for ocean health.

The OHI explains its relatively anthropocentric approach of goal selection by stating that:

[t]he Index’s focus on benefits to people and human well-being is strategic. When well-being improves, people can devote more attention and resources to social and environmental maintenance and improvement. When well-being decreases, people must do anything they can to survive; both social and natural environments will suffer.

Several immediate questions arise from this “strategic” decision of focusing on “what people want.” First, under the current economic system, increases in well-being are often fueled by unaccounted-for costs to natural systems. By the time that natural system status becomes incontrovertibly threatened by such pressures, the lifestyles and business practices that generated the pressures are often so entrenched that they are difficult to change (*e.g.*, greenhouse gas-fueled climate change). A more protective approach would be one that guides us toward appropriately precautionary policy actions that shift the burden of proof onto the harmful action, rather than onto natural systems. Paradoxically, however, the OHI grades *down* nations that “underuse ocean benefits ... to protect resources against future uncertainty,”²⁰ marginalizing efforts to retain healthy ecosystem and species functions.

In addition, the above-quoted anthropocentric strategy comes with the intimation that poorer people care less about environmental well-being, and that we must hold off on environmental protection until all nations have fully “developed.” However, surveys of attitudes towards the environment suggest the opposite: that the wealthier, more developed nations (particularly the U.S.) tend to most comprehensively fail to limit their massive contributions toward environmental degradation and feel the least guilty about their part of the problem.²¹ From a more practical standpoint, if we encourage the current pattern of destructive economic utilization of the natural world to continue as our long-term definition of “development,” we will virtually assure that future humans will be fortunate to enjoy any healthy natural systems at all. Accordingly, a focus not on what people want, but what is best for the entire system (of which we are just one part), sets us on a stronger path toward *overall* well-being. This necessarily includes ocean “health” for its own sake.

Finally, the OHI further advances its human-focused strategy for determining ocean “health” through its scoring assumptions, which weight each of the adopted goals equally. The results of such scoring may have the import of science, but in fact they are grounded in policy-based choices. Different policymaking choices, and particularly more precautionary policy actions, are possible.

¹⁹ Conservation International, “Ocean Health Index,” available at: <http://www.oceanhealthindex.org/>.

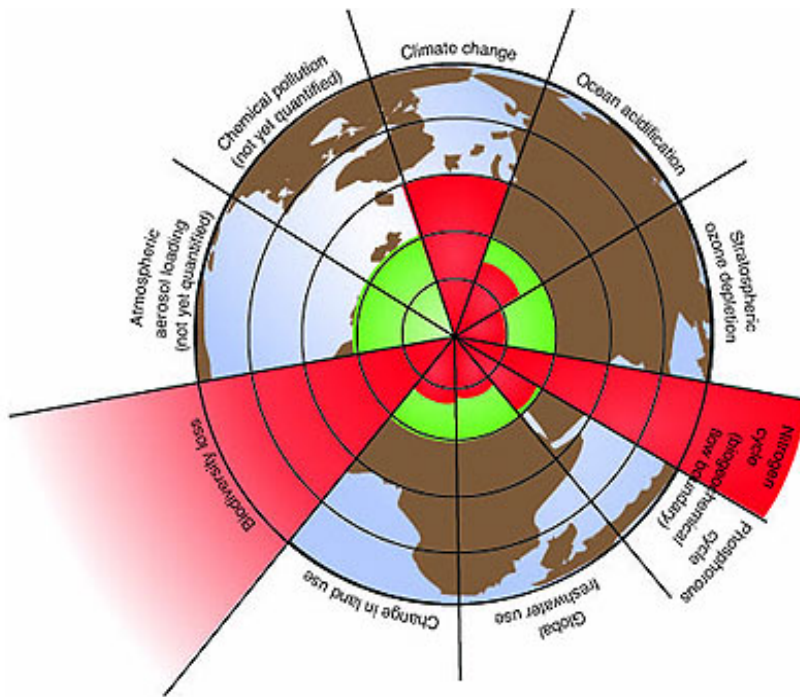
²⁰ Ocean Health Index 2013, *supra*, p. 2-3.

²¹ See, *e.g.*, Monbiot, George, “Are We Bothered?” (May 16, 2014), available at: <http://www.monbiot.com/2014/05/16/are-we-bothered/>.

For example, the summary of the OHI 2013 results finds that “[s]ome countries may underuse ocean benefits such as food or tourism to protect resources against future uncertainty, thereby producing a score less than 100 in the current calculation.” This characterization implies a policy conclusion from the goal score that if the fisheries goal scores “low,” the nation could and should catch more fish. But is that the appropriate choice for ocean “health” from the ocean’s perspective? And more broadly, should we be setting extraction as the default, rather than precautionary behavior that looks toward *increasing* ocean well-being? As recognized in the MLPA, an approach focused on the well-being of the ecosystem appears more likely to ensure “health” for both people and planet.

Looming Ocean Tipping Points Call for Swift Action

The impacts of application of human-centered definitions of ocean “health” can be illustrated further through comparison with other measures of planetary well-being. For example, scientists advancing the “Planetary Boundaries”²² initiative describe “planetary boundaries” as the point beyond which there may be “irreversible and abrupt environmental change.” Under the initial conclusions from this initiative, current biodiversity loss is *already* well past carrying capacity, a finding apparently at odds with some of the OHI scores.²³



See: <http://www.stockholmresilience.org/21/research/research-programmes/planetary-boundaries/planetary-boundaries/about-the-research.html>

²² Rockström, Johan et al., “A safe operating space for humanity,” *Nature*, Vol. 461, pp. 472-475 (Sept. 24, 2009); see <http://www.nature.com/news/specials/planetaryboundaries/index.html>.

²³ For example, the 2013 OHI results for global OHI biodiversity is 89 for habitats and 82 for species (out of 100).

In their responses to critiques of this work,²⁴ scientists explained that biodiversity loss, nitrogen, phosphorus²⁵ and other variables are “slow variables” in the Earth system for which there is evidence of tipping points (*i.e.*, where changes in ecosystem functioning become non-linear) at local and regional scales, which in turn may add up to a global concern if they occur at relatively the same time and at multiple places. A “health” scoring system that weighs in favor of human benefits, rather than system well-being, may miss such biophysical thresholds, and ignore the potential need for harder limits on extraction and use.

The Planetary Boundaries initiative is a beginning foray into these issues, and we may not know until hindsight how far we are now from a tipping point in metrics such as marine biodiversity. However, this would appear to be even more of a reason to support a precautionary approach in science and policy. Development of a definition of ocean “health” that recognizes and advances intrinsic ocean well-being will support needed action.

Conclusions

To track progress toward ocean “health” as called for by state law and ecosystem needs, and to evolve our single-media regulatory structures to achieve ecosystem-based governance, we must take up the task of defining a “healthy” ocean. Defining ocean “health” sets a clear policy and science vision for our ocean programs, and avoids conflating actions towards health with actual health results. A consistent definition of ocean “health” will also enhance the OPC’s role in coordinating and facilitating ecosystem-based governance across relevant agencies, as envisioned by COPA. Accessible, science-based metrics developed through these efforts will also provide consistent assessment of agency performance, further improving chances for success.

Scientifically-informed, public discussions about the definition of ocean health and strategies for assessing it are needed now, to set a path for how we live with the ocean in a way that ensures its – and therefore our – continued well-being. Thank you for taking up this important task.

Best regards,



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²⁴ See Rockström, J., “Addressing Some Key Misconceptions,” available at: <http://www.stockholmresilience.org/21/research/research-news/7-2-2012-addressing-some-key-misconceptions.html>; see also Galaz, V. *et al.*, “Environment: Planetary boundaries concept is valuable,” *Nature*, Vol. 486, p. 191 (June 14, 2012), available at: <http://www.nature.com/nature/journal/v486/n7402/full/486191c.html> and summarized here: <http://www.stockholmresilience.org/21/research/research-news/7-2-2012-planetary-boundaries-are-valuable-for-policy.html>.

²⁵ As noted in Rockström, Johan *et al.* (2009), *supra*, “[a]nthropogenic distortion of the nitrogen cycle and phosphorus flows” has shifted a number of marine systems to anoxic conditions, justifying the proposed planetary boundaries. They explain that “[r]ecords of Earth history show that large-scale ocean anoxic events occur when critical thresholds of phosphorus inflow to the ocean are crossed,” which “potentially explains past mass extinctions of marine life.” They also add that “[t]ransgressing the nitrogen-phosphorus boundary can erode the resilience of some marine ecosystems, potentially reducing their capacity to absorb CO₂...” Their proposed boundaries arose in part from their finding that “[m]odelling suggests that a sustained increase of phosphorus flowing into the oceans exceeding 20% of the natural background weathering was enough to induce past ocean anoxic events.”