It All Adds Up: Enhancing Ocean Health by Improving Cumulative Impacts Analyses in Environmental Review Documents

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I. INTRODUCTION

Coastal and marine ecosystems provide a variety of benefits, including seafood, transportation of goods, recreation and energy, employment, and well being for human communities. However, human activities—ranging from sea-based activities such as fishing, aquaculture, and shipping to land-based activities such as development, agriculture, and mining—are pervasive and are escalating pressure on marine species and ecosystems.[1] Generally, the total cumulative impact of these activities on ocean ecosystems is greater than each activity's impact in isolation, and the combination of activities has the potential to cause severe environmental degradation.[2] Congress and the California Legislature

1. *See* Benjamin S. Halpern et al., *A Global Map of Human Impact on Marine Ecosystems*, 319 SCI. 948, 948-52 (2008).

2. *See* Caitlyn M. Crain et al., *Interactive and Cumulative Effects of Multiple Human Stressors in Marine Systems*, 11 ECOLOGY LETTERS 1304, 1309 (2008); Heike K. Lotze & Boris Worm, *Complex Interactions of Climatic and Ecological Controls on Macroalgal Recruitment*, 47 LIMNOLOGY & OCEANOGRAPHY, 1734-41 (2002), *available at* http://tinyurl.com/pjmgshj.

recognized this potential when they enacted the National Environmental Policy Act (NEPA)[3] and the California Environmental Quality Act (CEQA),[4] respectively, over forty years ago and included provisions requiring agencies to assess the cumulative environmental impacts of their actions. These statutes apply to ocean and coastal areas under federal and state jurisdiction, respectively.

Despite environmental management mandates to analyze cumulative impacts as part of environmental reviews, there is evidence that cumulative impacts are continually increasing, particularly in marine ecosystems.[5] This article seeks to address the ways in which agencies and contracted consultants can conduct cumulative impacts analyses consistent with sound science under the existing law. The article also adds to the current body of scholarly literature on cumulative impacts by emphasizing marine-based cumulative impacts—a topic few legal scholars have addressed.[6] This topic is also relevant because marine environments are comprised of complex ecosystems, many of which are challenging to study and generally less understood than terrestrial ecosystems.[7]

Section II introduces scientific insights on how cumulative impacts interact via direct and indirect impacts to the marine environment. Section III provides a brief overview of both NEPA and CEQA's cumulative impacts requirements. The discussion will first analyze cumulative impacts assessment requirements under NEPA, as it is the foundational federal environmental review statute and applies to the majority of the United States' marine environments,

3. National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321-4347 (2014).

4. California Environmental Quality Act, CAL. PUB. RES. CODE §§ 21000-21181 (2014).

5. *See generally* Natalie C. Ban et al., *Cumulative Impact Mapping: Advances, Relevance and Limitations to Marine Management and Conservation, Using Canada's Pacific Waters as a Case Study*, 34 MARINE POL'Y 876, 876-77 (2010)*; see also* Halpern et al., *supra* note 1, at 948-52; K. A. Selkoe et al., *A Map of Human Impacts to a "Pristine" Coral Reef Ecosystem: The Papahānaumokuākea Marine National Monument*, 28 CORAL REEFS 635, 635-36 (2009).

6. *See* Martin H. Belsky, *The Ecosystem Model Mandate for a Comprehensive United States Ocean Policy and Law of the Sea*, 26 SAN DIEGO L. REV. 417, 484-85 (1989); Richard Heisler, *A Whale of a Tale:* NRDC v. U.S. Navy *and the Attempt to Exempt the Exclusive Economic Zone from the National Environmental Policy Act*, 10 SW. J.L. & TRADE AM. 125, 144-45 (2004); Ingrid Nugent & Laura Cantral, *Charting A Course Toward Ecosystem-Based Management in the Gulf of Mexico*, 16 DUKE ENVTL. L. & POL'Y F. 267, 269 (2006); Alison Rieser, *Managing the Cumulative Effects of Coastal Land Development: Can Maine Law Meet the Challenge?*, 39 ME. L. REV. 321, 328-29 (1987).

7. Peter M. Vitousek et al., *Human Domination of Earth's Ecosystems*, 277 SCI. 494, 495 (1997).

reaching beyond state waters[8] through the exclusive economic zone 200 nautical miles offshore.[9] Next, the article will focus on state-level cumulative impacts analysis by examining the current state of the law within California. Because California's ocean and coastal laws and management practices are often on the leading frontier,[10] improving cumulative impacts assessments in California could serve as a viable model for proactive practices in other states. Section IV examines key challenges in making the law of cumulative impacts actionable and provides recommendations for agencies and legal practitioners to better align cumulative impacts assessment requirements with the best available science.[11]

II. THE SCIENCE BEHIND CUMULATIVE IMPACTS INTERACTIONS

The environmental effects caused by human activities do not occur independently of one another. Instead, new activities often interact with other residual impacts from prior or ongoing activities, producing a range of impacts. Together, the combined effects of activities result in cumulative impacts to a suite of ecological components, such as marine organisms and habitats. In addition, natural shifts and changes in the environment over the short- and long-term (e.g., seasonal temperatures and daily tides) further complicate the picture.[12] The effects from human activities may also

8. State coastal waters generally extend three nautical miles offshore. *See* Submerged Lands Act of 1953, 43 U.S.C. § 1312 (2014).

9. Waters under federal jurisdiction extend seaward from state coastal water boundaries to 200 nautical miles offshore. *See* The Outer Continental Shelf Lands Act of 1953, 43 U.S.C. §§ 1331-33 (2014); Proclamation No. 5030, 48 Fed. Reg. 10,605 (Mar. 14, 1983); *see also* Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1802(11) (2014); United Nations Convention on the Law of the Sea, Dec. 10, 1982, 183 U.N.T.S. 43-44, *available at* http://tinyurl.com/ocp2cpe. In some cases, particularly where there are substantial environmental effects in U.S. territory, agencies apply NEPA even beyond the U.S. Exclusive Economic Zone. *See generally Seaward Limit of US Laws*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., OFFICE OF GEN. COUNSEL, http://tinyurl.com/o5cy6w2 (last visited Apr. 20, 2014); NAT'L OCEANIC & ATMOSPHERIC ADMIN., ENVIRONMENTAL REVIEW PROCEDURES FOR IMPLEMENTING THE NATIONAL ENVIRONMENTAL POLICY ACT §§ 3.01, 7.01 (1999), *available at* http://tinyurl.com/pkurv58.

10. *See, e.g.*, California Ocean Protection Act, CAL. PUB. RES. CODE §§ 35500-35650 (2014); California Marine Life Protection Act, CAL. FISH & GAME CODE §§ 2850-2863 (2014); Marine Life Management Act, CAL. FISH & GAME CODE §§ 7050-7090 (2014); California Coastal Act of 1976, CAL. PUB. RES. CODE §§ 30000-30900 (2014).

11. While our analysis focuses on recommendations within the existing legal frameworks, see Gail Kamaras, *Cumulative Impact Assessment: A Comparison of Federal and State Environmental Review Provisions*, 57 ALB. L. REV. 113, 140-41 (1993), for recommended amendments to current regulations.

12. *See* Crain et al., *supra* note 2, at 1304-05; *see also* Cathryn Clarke Murray et al.,

be delayed in time or geography. For instance, nutrient runoff from Midwest farms in the United States creates "dead zones" in the Gulf of Mexico, hundreds of miles away from the farms and days, weeks, or even months after the runoff occurs.[13] Cumulative effects can therefore result from a repeated stressor produced by a single activity, multiple stressors from a single activity, or multiple stressors from multiple related or unrelated activities. These activities and stressors can combine to have either additive (e.g., A+B = A+B) or interactive effects on the environment (Figure 1).[14]

Scientific Perspectives on Cumulative Effects in Marine Ecosystems 3-5 (Dec. 17, 2013) (unpublished manuscript) (on file with authors).

13. Robert J. Diaz & Rutger Rosenberg, *Spreading Dead Zones and Consequences for Marine Ecosystems*, 321 SCI. 926, 928 (2008) (noting that it may take years to recover from severe hypoxia); Nancy N. Rabalais et al., *Gulf of Mexico Hypoxia, a.k.a. "The Dead Zone"*, 33 ANN. REV. OF ECOLOGY & SYSTEMATICS 235, 255 (2002). For nitrogen retention in surface waters, see generally Stefan Halbfaß et al., *Modelling of Long Term Nitrogen Retention in Surface Waters*, 27 ADVANCES IN GEOSCIENCES 145, 145-48 (2010), *available at* http://tinyurl.com/kctanjy.

14. *See* Harry Spaling & Barry Smit, *Cumulative Environmental Change: Conceptual Frameworks, Evaluation Approaches, and Institutional Perspectives*, 17 ENVTL. MGMT. 587, 591 (1993). Both stressors and effects can interact. An example of a stressor interaction is the interaction between ocean acidification and ocean noise: acidification makes the ocean noisier. An example of an effects interaction is the effect of nutrient enrichment, temperature, and grazing on recruitment of bloom-forming algae. *See* Lotze & Worm, *supra* note 2, at 1734.

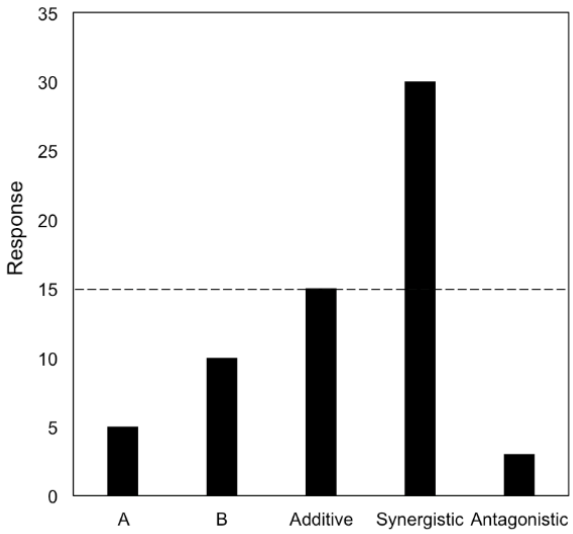

Figure 1. Cumulative effect relationships between individual stressors A and B. The default assumption is that stressors are additive (the dashed line). Additive: stressors add together to create impact (e.g., A+B); Synergistic: stressors together produce greater impact than each individually (e.g., A*B); Antagonistic: stressors counteract each other in some way so that together the impact is less than the individual stressors together (e.g., A-B).[15]

Although most cumulative impacts assessments assume that the impacts of stressors are additive, it has been established that the majority of impacts actually interact in synergistic or antagonistic ways.[16] Synergistic effects occur when the net adverse cumulative effect is greater than the sum of the individual effects (e.g., A+B=A*B), while antagonistic effects occur when the net adverse cumulative effect is less than the sum of the individual effects (e.g., (A+B) < (A) + (B)).[17] The concept of synergism is especially problematic because it suggests that multiple activities that co-occur may have much greater impacts than could be expected or predicted

15. *See* Murray et al., *supra* note 12, at 6 (adapted from Crain et al., *supra* note 2, at 1305). This figure (Figure 1 in Murray et al., 2014) has been reproduced with permission from WWF-Canada.

16. *See* Crain et al., *supra* note 2, at 1305; Emily S. Darling & Isabelle M. Côté, *Quantifying the Evidence for Ecological Synergies*, 11 ECOLOGY LETTERS 1278, 1278-1279 (2008).

17. *See* Darling & Côté, *supra* note 16, at 1278-79; *see also* COUNCIL ON ENVTL. QUALITY, CONSIDERING CUMULATIVE EFFECTS UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT 9 (1997), *available at* http://tinyurl.com/nc7vg8h [hereinafter CEQ Cumulative Effects Guidance].

from the presence of each individual activity.[18] In addition, new environmental impacts can stack onto old impacts, causing continued environmental degradation. Sometimes this happens over a long period of time such that present generations come to understand the current environmental setting as their "new normal"—also known as a "shifting baseline."[19]

Nutrient runoff from agriculture along the Mississippi River into the Gulf of Mexico can be an example of both additive and synergistic effects. The additive effects component occurs when Midwest farms use fertilizer in their operations, since they often indirectly add those nutrients to the Gulf of Mexico through runoff into the Mississippi River. Because each farm is likely to apply more than one round of any given fertilizer throughout its lifespan, an individual farm is an example of a single activity that produces a stressor that accumulates over time (multiple applications of fertilizer).[20] Agriculture along the Mississippi is also an example of multiple activities with additive effects from a single stressor, because there are multiple farms adding similar fertilizers to the land. As nutrients enter the Gulf of Mexico, they cause phytoplankton to bloom; bacteria decompose the phytoplankton as they sink to the bottom, resulting in oxygen depletion, or hypoxia.[21] The initial effects of those nitrogen and phosphorus nutrient inputs to the Gulf of Mexico are likely to be additive, increasing hypoxia with more nutrients (Figure 2). When all the farms along the Mississippi fertilize their crops at the same time, the high influx of

18. Rebecca Goldman Martone & Kerstin Wasson, *Impacts and Interactions of Multiple Human Perturbations in a California Salt Marsh,* 158 OECOLOGIA 151, 151 (2008). Unexpected or unpredicted interactions among stressors may also lead to rapid changes from one ecological condition to another, and incremental changes in human use or environmental conditions can result in large, and sometimes abrupt, impacts to marine ecosystems. *See generally* Andrew Bennett & Jim Radford, *Know Your Ecological Thresholds*, 1 THINKING BUSH 1 (Apr. 2003), *available at* http://tinyurl.com/knzzzpo; Peter M. Groffman, et al., *Ecological Thresholds: The Key to Successful Environmental Management or an Important Concept with No Practical Application?*, 9 ECOSYSTEMS 1 (2006); Andrew J. Huggett, *The Concept and Utility of 'Ecological Thresholds' in Biodiversity Conservation*, 124 BIOLOGICAL CONSERVATION 301 (2005); Katharine N. Suding & Richard J. Hobbs, *Threshold Models in Restoration and Conservation: A Developing Framework*, 24 TRENDS ECOLOGY & EVOLUTION 271 (2009). Commonly known as "tipping points," these ecological phenomena will be described and discussed in the context of cumulative impacts in Section IV.

19. *See generally* Daniel Pauly, *Anecdotes and the Shifting Base-Line Syndrome of Fisheries*, 10 TRENDS ECOLOGY & EVOLUTION 430 (1995) (discussing shifting baselines in the context of fisheries). We discuss the idea of shifting baselines in greater detail in Section IV.

20. Agriculture operations also add pesticides to their crops to increase yields, producing another stressor on downstream coastal zones, illustrating an example of a single activity with multiple stressors.

21. Diaz & Rosenburg, *supra* note 13, at 926-27.

nutrients results in large plankton blooms. These plankton sink and are decomposed by bacteria, depleting oxygen from large areas of water. These extreme hypoxic conditions result in mortality of fish, shrimp and crab important to fisheries, reduced biodiversity, and altered community structure and ecosystem functioning.[22]

Synergistic effects come into play with the addition of sea surface temperatures since rising temperatures further exacerbate the effects of nutrient runoff on the community and ecosystem. For example, increasing sea surface temperatures and increasing nutrient loads together have a synergistic effect on the recruitment of bloom-forming macroalgae (Figure 2).[23] Nutrients only slightly increase the presence of bloom-forming algae under cooler temperatures, but when temperatures get warmer, nutrient enrichment further enhances algal blooms by one to two orders of magnitude.[24] Thus, the combined effect of rising temperatures and increased nutrient loads have a more negative impact on marine life than would be expected from these two impacts added together (Figure 2).[25]

22. *Id*.

23. Lotze & Worm, *supra* note 2, at 1738, 1740.

24. *See id*.

25. *See id*. (describing the synergistic effects of nutrients and water temperature); *see generally* C. Lardicci et al., *Detection of Thermal Pollution: Variability of Benthic Communities at Two Different Spatial Scales in an Area Influenced by a Coastal Power Station*, 38 MARINE POLLUTION BULL. 296, 297-98 (1999), *available at* http://tinyurl.com/l2nwf5g (describing water temperature increase due to thermal discharges from power plants); Michael A. Mallin & Lawrence B. Cahoon, *Industrialized Animal Production—A Major Source of Nutrient and Microbial Pollution to Aquatic Ecosystems*, 24 POPULATION & ENV'T 369, 377 (2003), *available at* http://tinyurl.com/mmxy2fk (discussing livestock causing nutrient pollution).

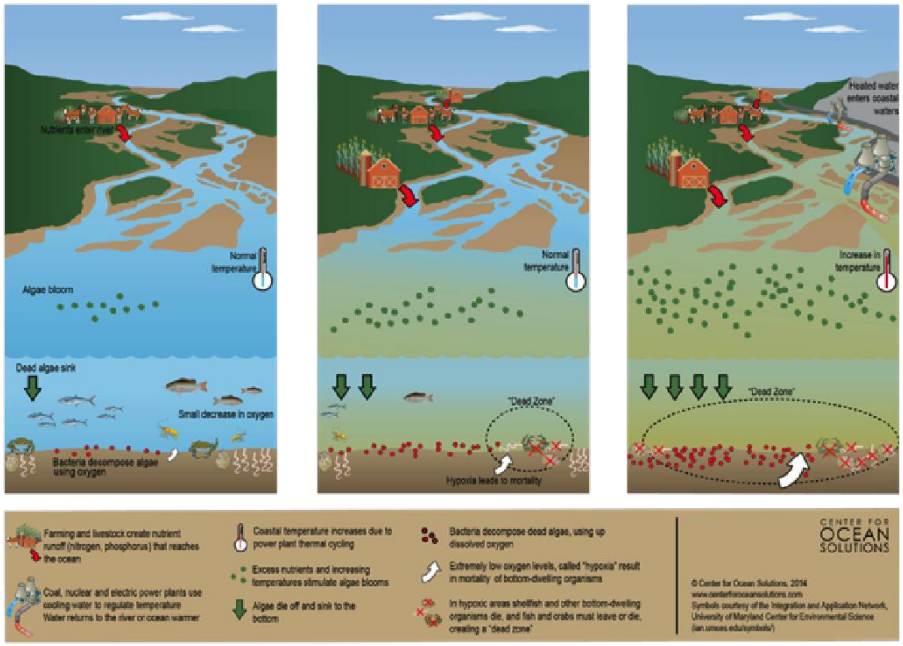

Figure 2. Additive effects of nutrient runoff and synergistic effects of increase temperature and nutrient runoff.

III. THE WHAT, WHEN, AND HOW OF CUMULATIVE IMPACTS ANALYSIS UNDER NEPA AND CEQA

Both NEPA and CEQA require agencies to assess cumulative impacts in order to understand how a proposed agency action may affect the environment. This section introduces the legal frameworks for environmental assessment under both NEPA and CEQA and describes when each statute requires agencies to evaluate cumulative impacts, the legal definitions of cumulative impacts, and how agencies should discuss cumulative impacts based on both statutory and case law requirements.

A. *Cumulative Impacts Analysis Under NEPA*

All "major [f]ederal actions significantly affecting the quality of the human environment" trigger NEPA's environmental review requirements.[26] The White House Council on Environmental Quality, the agency with oversight responsibility for NEPA, promulgated

26. National Environmental Policy Act of 1969, 42 U.S.C. § 4332(C) (2014).

regulations clarifying the meaning of this phrase.[27] Pursuant to the regulations, "major federal action[s]" include "projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies; new or revised agency rules, regulations, plans, policies or procedures; and legislative proposals."[28]

1. *What impacts are considered cumulative*

NEPA regulations define cumulative impacts as the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions."[29] The regulations contemplate considering activities from a multiplicity of sectors. Cumulative impacts can result from projects that have already been completed (past projects) and present projects, in addition to proposed future projects.[30] The NEPA regulations further recognize that cumulative impacts can result from "individually minor but collectively significant actions taking place over a period of time."[31]

2. *When and how cumulative impacts are analyzed*

NEPA regulations discuss cumulative impacts in the context of (1) the preparation of Environmental Assessments (EAs),[32] (2) the

27. *See* Council on Environmental Quality, 40 C.F.R. § 1508.18 (2014). Note that all federal agencies are required to develop NEPA procedures that supplement the Council on Environmental Quality's NEPA regulations. Environmental Quality Improvement, 42 U.S.C. § 4371(c)(1) (2014); Council on Environmental Quality, 40 C.F.R. § 1507.3 (2014). Unless otherwise specified, "NEPA regulations" refers to the regulations developed and adopted by the White House Council on Environmental Quality.

28. Council on Environmental Quality, 40 C.F.R. § 1508.18(a). The regulations divide these actions into four categories: the adoption of official policies; the adoption of formal plans; the adoption of programs; and the approval of specific projects, all of which constitute "[f]ederal actions" for the purposes of environmental review. *Id*. at § 1508.18(b). Nondiscretionary agency actions (i.e., actions that agencies are legally mandated to perform), however, are not "major federal actions" and generally do not trigger NEPA or the requirement to prepare an EIS. *See, e.g.*, Sierra Club v. Babbitt, 65 F.3d 1502, 1512 (9th Cir. 1995) (listing cases demonstrating that nondiscretionary agency action does not trigger NEPA requirements).

29. Council on Environmental Quality, 40 C.F.R. § 1508.7 (2014).

30. *Id.*; CEQ Cumulative Effects Guidance, *supra* note 17, at 8.

31. *Id*.

32. The definition of "environmental assessment" provides that EAs "[s]hall include brief discussions of . . . the environmental impacts of the proposed action and alternatives."

preparation of Environmental Impact Statements (EISs),[33] and (3) the determination of significance.[34] In addition to the regulations' framework for *when* agencies should discuss cumulative impacts and *what* those impacts include, case law has clarified the requirements for *how* agencies should discuss cumulative impacts. In *Oregon Natural Resources Council Fund v. Brong*, the Ninth Circuit held that a cumulative impacts analysis must "be more than perfunctory; it must provide a *useful analysis* of the cumulative impacts of past, present and future projects."[35] A useful analysis must both identify relevant projects and enumerate the environmental effects of those projects.[36] Finally, a useful analysis must "consider the interaction of multiple activities and [not] focus exclusively on the environmental impacts of an individual project."[37]

The holding emphasizes that the analysis should demonstrate a rational connection between the facts in the record and the agency's conclusions.[38] Accordingly, courts have also held that even though agency experts are entitled to deference, "generalized, conclusory assertions from agency experts are not sufficient; the agency must

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Council on Environmental Quality, 40 C.F.R. § 1508.9(b) (2014). While *cumulative* impacts are not explicitly mentioned, they are included in the definition of "effects" and therefore must be discussed. Section 1508.8, which defines "effects," states that "[e]ffects and impacts as used in [the] regulations are synonymous." *Id*. § 1508.8. Effects, in turn, include those that are "ecological . . . aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, *or cumulative*." *Id*. (emphasis added). Guidance by the White House Council on Environmental Quality emphasizes the importance of assessing cumulative effects in EAs. It notes that "[t]he increased use of EAs rather than EISs in recent years could exacerbate the cumulative effects problem. Agencies today prepare substantially more EAs than EISs; in a typical year 45,000 EAs are prepared compared to 450 EISs." CEQ Cumulative Effects Guidance, *supra* note 17, at 4.

33. Section 1502.16 uses the same language requiring EISs to discuss "the environmental effects of the alternatives[,] including the proposed action" in the document's "Environmental Consequences" section. Council on Environmental Quality, 40 C.F.R. § 1502.16 (2014). As in the case of EAs, this requirement encompasses consideration of cumulative impacts since the regulations define effects to include cumulative impacts. *Id*. § 1508.8.

34. NEPA regulations also mention cumulative impacts within the listed criteria for evaluating intensity to determine significance. *Id*. § 1508.27(b)(7). One of the factors of intensity is whether the action is "related to other actions with individually insignificant but cumulatively significant impacts." *Id*. Agencies may not segment proposed projects into multiple actions or impact statements, each of which "individually has an insignificant environmental impact, but which collectively have a substantial impact," in order to avoid finding cumulatively significant impacts. Earth Island Inst. v. U.S. Forest Serv., 351 F.3d 1291, 1305 (9th Cir. 2003) (quoting Thomas v. Peterson, 753 F.2d 754, 758 (9th Cir.1985)); *see also* 40 C.F.R. §§ 1508.25, 1508.27(b)(7).

35. 492 F.3d 1120, 1133 (9th Cir. 2007) (citations omitted).

36. *Id*.

37. *Id*.

38. *Id*.

provide the underlying data supporting the assertion in language intelligible to the public."[39] Moreover, although agencies still maintain the discretion to choose one particular view when faced with competing information, they must justify their choice and address opposing views.[40] Multiple circuits have held that in order to fulfill NEPA's requirement that agencies take a "hard look" at the environmental impacts of an action, agencies typically must include some quantified or detailed information: "[g]eneral statements about possible effects and some risk do not constitute a hard look absent a justification for why more definitive information could not be provided."[41]

In sum, NEPA requires analysis of cumulative impacts in the preparation of EAs and EISs and in determinations of significance. Cumulative impacts analyses must include a thorough assessment of the interactions between a proposed project's potential effects and the effects of other past, present, and future actions. Also, when conducting a cumulative impacts analysis, agencies should ensure that they provide thorough justification for their conclusions. By justifying their choices in the face of uncertainty or conflicting opinions, agencies may fulfill NEPA's primary goal of informing the public of the potential environmental ramifications of agency actions.

B. *Cumulative Impacts Analysis Under CEQA*

Once an agency has determined that a project is subject to CEQA, it must undertake essentially the same review process that NEPA requires, only with different terminology (see Table 1).[42] The most

39. Or. Natural Res. Council Fund v. Goodman, 505 F.3d 884, 893 (9th Cir. 2007).

40. The D.C. Circuit specified that "the court should 'ensure that the statement contains sufficient discussion of the relevant issues and opposing viewpoints to enable the decisionmakers to take a 'hard look' at environmental factors, and to make a reasoned decision.'" Natural Res. Def. Council, Inc. v. Hodel, 865 F.2d 288, 294 (D.C. Cir. 1988) (quoting Izaak Walton League of Am. v. Marsh, 655 F.2d 346, 371 (D.C.Cir.1981)).

41. League of Wilderness Defenders—Blue Mountains Biodiversity Project v. U.S. Forest Serv., 689 F.3d 1060, 1075 (9th Cir. 2012) (quoting *Brong*, 492 F.3d at 1134). Notably, the Tenth Circuit—which does not contain any coastal states—has diverged from this standard and held that a "hard look" does not always require hard data. Morris v. U.S. Nuclear Regulatory Comm'n, 598 F.3d 677, 693 (10th Cir. 2010) (holding that the Nuclear Regulatory Commission did not have to quantify the amount of airborne radiation emitted from past uranium mining debris in the vicinity of a proposed uranium mining project because the Commission predicted the proposed project would result in a negligible increase in radiation).

42. EXEC. OFFICE OF THE PRESIDENT & CAL. OFFICE OF PLANNING & RESEARCH, DRAFT NEPA &

notable difference between NEPA and CEQA is that CEQA is action-forcing, such that agencies may not approve projects proposed under CEQA if there are feasible alternatives or mitigation measures that would avoid or lessen the significant effects a project might have on the environment.[43] Consequently, "CEQA, as compared to NEPA, places a greater emphasis on mitigating adverse environmental impacts."[44]

Under NEPA	Under CEQA
Finding of No Significant Impact (FONSI)	Negative Declaration
Environmental Assessment	Initial Study
Environmental Impact Statement	Environment Impact Report
Notice of Intent	Notice of Preparation
Record of Decision	Notice of Determination
Cooperating Agency	Responsible Agency/Trustee Agency

Table 1. Comparison of Statutory and Regulatory Terminology Under NEPA and CEQA.

Also like NEPA, an agency needs to develop an Environmental Impact Report (EIR) only if the project may have significant effects on the environment,[45] which the CEQA regulations define as "a substantial adverse change in the physical conditions which exist in the area affected by the proposed project."[46] If an agency determines in its Initial Study that there is a fair argument that a proposed project may have a significant effect on the environment, it must

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CEQA: INTEGRATING STATE & FEDERAL ENVIRONMENTAL REVIEWS 7-9 (2013), *available at* http://tinyurl.com/lnlhk75.

43. CAL. CODE REGS. tit. 14, § 15021(a)(2) (2014); *Id.* § 15092(b) (2014). In spite of this action-forcing language, agencies may determine that unavoidable significant impacts are acceptable after balancing "the economic, legal, social, technological, or other benefits" of a proposed project by issuing a statement of overriding considerations. *Id.* § 15093 (2014).

44. Brian Troxler, *Stifling the Wind: California Environmental Quality Act and Local Permitting,* 38 COLUM. J. ENVTL. L. 163, 176-77 (2013).

45. An EIR is required if there are potentially significant impacts. CAL. CODE REGS. tit. 14, § 15064(a)(1) (2014).

46. *Id.* § 15002(g)*; see also* Erin E. Prahler et al., A Note About Cumulative Impact Analysis Under Functionally Equivalent Programs (2014), *available at* http://tinyurl.com/mzzdme7 [hereinafter "FEP Supplement"] (online supplement to this article).

prepare an environmental impact report.[47]

1. *What impacts are considered cumulative*

CEQA regulations define "cumulative impacts" similarly to NEPA, as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts."[48] Cumulative impacts can result from one or more projects,[49] and "[t]he cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects."[50] The regulations note that "[t]he mere existence of significant cumulative impacts caused by *other* projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable."[51] In other words, the preexisting presence of cumulative impacts *alone* does not require a finding of significance. Moreover, "[t]his definition treats as identical the aggregate impacts of a single project and the cumulative, incremental impacts of multiple projects."[52]

However, despite the CEQA definitions above, California courts have held that significant preexisting cumulative effects will make a significance finding for the proposed incremental contribution more likely. In *Kings County Farm Bureau v. City of Hanford*, the Court of Appeal addressed an EIR for a cogeneration steam and electricity plant proposal,[53] stating that

> "[t]he relevant question to be addressed in the EIR is not the relative amount of precursors [to ozone, NO_x, and NMHC] emitted by the project when compared with preexisting emissions, but whether any additional amount of precursor emissions should be considered significant in light of the serious nature of the ozone

47. The "fair argument" test is at the heart of CEQA. It has been articulated in the case law and appears in the Guidelines. CAL. CODE REGS. tit. 14 § 15064(f)(1).

48. *Id*. § 15355.

49. *Id*. § 15355(a).

50. *Id*. § 15355(b).

51. *Id*. § 15064(h)(4) (emphasis added). As noted above, an EIR must only discuss cumulative impacts in detail when the project's incremental effects are "cumulatively considerable," meaning "significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." *Id*. § 15065(a)(3).

52. Kamaras, *supra* note 11, at 118.

53. 221 Cal. App. 3d 692 (Cal. Ct. App. 1990).

problems in [the] air basin."[54]

It found that the incremental impact was cumulatively considerable because the air basin already had a serious problem with ozone, and even though the project's contribution to the total impact was relatively minor, the overall context made the air basin vulnerable to even the incremental impact.[55] Thus, an agency may not consider the incremental impact of a project to be insignificant based on its minor incremental impact or in light of overwhelming preexisting cumulative impacts.[56] Instead, in certain contexts, *any* additional impact may be considerable. The Court of Appeal explained the rule clearly, stating "[i]n the end, the greater the existing environmental problems are, the lower the threshold should be for treating a project's contribution to cumulative impacts as significant."[57]

2. *When and how cumulative impacts are analyzed*

Much like NEPA, the CEQA regulations discuss cumulative impacts in three contexts: the preparation of Initial Studies, the preparation of EIRs, and the determination of significance. First, an Initial Study must include "an identification of environmental effects."[58] Unlike NEPA, though, CEQA's regulatory definition of "effects" does not explicitly mention cumulative impacts.[59] The Initial Study section provides that "[i]f the agency determines that there is substantial evidence that any aspect of the project, either individually or *cumulatively*, may cause a significant effect on the environment" the agency shall, among other options, prepare an EIR.[60]

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54. *Id*. at 718.

55. *Id*. at 721.

56. *See, e.g.*, L.A. Unified Sch. Dist. v. City of L.A., 68 Cal. Rptr. 2d 367, 371 (Cal. Ct. App. 1997) (noting that the relevant issue to be addressed in the EIR "is not the relative amount of traffic noise resulting from the project when compared to existing traffic noise, but whether any additional amount of traffic noise should be considered significant in light of the serious nature of the traffic noise problem already existing around the schools").

57. Cmtys. for a Better Env't v. Cal. Res. Agency, 126 Cal. Rptr. 2d 441, 457 (Cal. Ct. App. 2002).

58. CAL. CODE REGS. tit. 14, § 15063(d)(3) (2014). As under NEPA, the terms "effects" and "impacts" are considered synonymous. *Id*. § 15358. Effects include: "[d]irect or primary effects which are caused by the project and occur at the same time and place" and "[i]ndirect or secondary effects which are caused by the project and are later in time or farther removed in distance, but are still reasonably foreseeable." *Id*.

59. CAL. CODE REGS. tit. 14, § 15063(d)(3) (2014).

60. *Id*. § 15063(b)(1) (emphasis added).

CEQA regulations also expressly require that EIRs include a discussion of a project's significant cumulative impacts.[61] When the cumulative impacts resulting from the proposed project's incremental effect combined with the effects of other projects are not significant, the discussion should briefly describe why they are not significant and that there will be no additional discussion of that cumulative impact in the EIR.[62]

Finally, the regulations imply that agencies should evaluate cumulative impacts in determining significance.[63] By defining significance as a response in physical conditions of the ecosystem, all impacts should be included in a determination of significance, including direct, indirect, and cumulative impacts.[64] Further, Section 15064, which deals with determining the significance of environmental effects of a project, specifically states that cumulative effects must be assessed to determine if an EIR is necessary.[65]

As to *how* cumulative impacts are analyzed, CEQA regulations and case law have established certain requirements for the contents of an EIR's cumulative impacts section. In *Preserve Wild Santee v. City of Santee* the court explained that:

> [t]he adequacy of an EIR's discussion of a project's cumulative impacts is determined by standards of practicality and reasonableness. The discussion must reflect the severity of the impacts and the likelihood of their occurrence, but need not contain the same degree of detail as the EIR's discussion of impacts attributable to the project alone.[66]

The CEQA regulations allow agencies to use two approaches to assess the significance of cumulative impacts: the "list" method and the "summary of projections" method.[67] Agencies using the list

61. *Id*. §§ 15065(a)(3), 15130(a).

62. *Id*. § 15130(a)(2).

63. Preparation of an EIR is mandatory if there may be a significant effect on the environment. CAL. PUB. RES. CODE § 21080(d) (2014). The regulations define a significant effect as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project[,] including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance." CAL. CODE REGS. tit. 14, § 15382 (2014).

64. CAL. CODE REGS. tit. 14, § 15064(d), (h).

65. *Id*. § 15064(h)(1).

66. Pres. Wild Santee v. City of Santee, 148 Cal. Rptr. 3d 310, 322 (Cal. Ct. App. 2012) (internal citations omitted).

67. CAL. CODE REGS. tit. 14, § 15130(b)(1)(A), (B) (2014). Unlike California projects

method must prepare a "list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency."[68] When creating a list of impacts, agencies must consider factors such as "the nature of each environmental resource being examined" and the "location of the project and its type" when they are determining whether to include a related project.[69] For example, when looking at water quality impacts, an agency will likely only look at projects within that same watershed.[70]

In contrast, agencies using the "summary of projections" method may base their cumulative impacts analysis on a summary of projections of conditions, future developments, and cumulative impacts contained in a planning document.[71] Examples of such documents include general plans, regional transportation plans, and greenhouse gas emissions reduction plans.[72] Agencies may also draw from projections in "adopted or certified prior environmental documents for such a plan."[73] However, agencies should be wary of projections that are inaccurate or outdated because such plans may no longer accurately estimate the state of the environment or predict the significance of potential future impacts.[74]

IV. ISSUES IN CUMULATIVE IMPACTS ASSESSMENT AND RECOMMENDATIONS FOR IMPROVEMENT

Despite the cumulative impacts analyses mandated by NEPA and CEQA, there is evidence that cumulative impacts are continually increasing, particularly in marine ecosystems.[75] Based on our review of the scientific and legal approaches to addressing cumulative impacts (Table 2), we identified five necessary components of cumulative impacts assessment that do not always

subject to CEQA's environmental review requirements, there is no consistent guidance for how agencies with certified Functionally Equivalent Programs should conduct cumulative impacts assessments. *See* FEP Supplement, *supra* note 46.

68. CAL. CODE REGS. tit. 14, § 15130(b)(1)(A) (2014).

69. *Id*. § 15130(b)(2). Scientific research could inform this analysis, including research on which stressors are likely to interact, spatial and temporal scale of stressors and effects, and sensitive or vulnerable ecosystem components and their interactions. *See generally* Murray et al., *supra* note 12.

70. CAL. CODE REGS. tit. 14, § 15130(b)(2) (2014).

71. *Id*. § 15130(b)(1)(B).

72. *Id*.

73. *Id*.

74. *See, e.g.*, Bakersfield Citizens for Local Control v. City of Bakersfield, 22 Cal. Rptr. 3d 203, 229 (Cal. Ct. App. 2004).

75. Halpern et al., *supra* note 1, at 948-52; Selkoe et al., *supra* note 5, at 635-36.

align with statutory mandates or with scientific principles in practice, including: (1) analyzing related impacts; (2) establishing a baseline; (3) including past impacts; (4) incorporating future impacts; and (5) defining geographic scope.

Cumulative Impacts: The Scientific vs. Legal Practice			
	Scientific Understanding & Practice	**CEQA Requirements & Practice**	**NEPA Requirements & Practice**
Definition	The temporal and spatial accumulation of environmental change due to impacts from an individual activity that recurs over time and/or space or impacts from multiple activities with temporal and/or spatial overlap. Interactions between cumulative effects can result in impacts greater than each impact individually.	"'Cumulative impacts' refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. (a) The individual effects may be changes resulting from a single project or a number of separate projects. (b) The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time."	Cumulative impacts refers to the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions." The regulations recognize that cumulative impacts can result from "individually minor but collectively significant actions taking place over a period of time."

Table 2. Two community practices for describing and conducting cumulative impacts analyses: comparing the scientific practice to the legal and policy practice under CEQA and NEPA.

	Scientific Understanding & Practice	CEQA Requirements & Practice	NEPA Requirements & Practice
General Methodology	Start with a historical baseline.	Start with a baseline of current conditions.	Start with a baseline of current conditions.
	Include all impacts in the analysis regardless of their individual status of significance.	Only consider project impacts if (1) when combined with impacts of other past, present, and future projects they are cumulatively significant and (2) the incremental effects of the project are cumulatively considerable.	Varies by Circuit, but Ninth Circuit, for example, holds that agencies may not segment proposed projects into multiple actions or impact statements, each of which "individually has an insignificant environmental impact, but which collectively have a substantial impact." Conduct a useful analysis that entails both (1) identifying relevant projects and (2) enumerating the effects of those projects.
	Include all projects in the analysis regardless of the type of impact they have on the ecosystem.	Only consider projects that may cause impacts similar to, or related to, the impacts caused by the proposed project.	Varies by Circuit, but Ninth Circuit, for example, states agencies must "consider the interaction of multiple activities and [not] focus exclusively on the environmental impacts of an individual project." When faced with competing information, justify choices and address opposing views.

Table 2. Two community practices for describing and conducting cumulative impacts analyses: comparing the scientific practice to the legal and policy practice under CEQA and NEPA.

Scientific Understanding & Practice	CEQA Requirements & Practice	NEPA Requirements & Practice
Determine significance of interactions based on laboratory and field experiments.	"[T]he more severe existing environmental problems are, the lower the threshold should be for treating a project's contribution to cumulative impacts as significant."	Multiple Circuits hold that a "hard look" at an action's environmental impacts may require quantified data or a detailed analysis.
Use laboratory and field experiments to determine if impact combinations act in synergistic, antagonistic, or additive ways.		
Use models to enumerate impact to the ecosystem using a combination of habitat, activity, and ecosystem vulnerability data.		

Table 2. Two community practices for describing and conducting cumulative impacts analyses: comparing the scientific practice to the legal and policy practice under CEQA and NEPA.

We first examine the instances in which agencies analyze only the effects of related projects rather than projects with related impacts. By limiting their search to only those projects that are similar in type to the proposed project, agencies may fail to account for other past, present, and future projects that have cumulative effects relevant to the proposed projects' impacts.[76] Then, we consider the complicated issue of baseline, and specifically how agencies establish a baseline, noting that the baselines selected often do not align with scientific principles. In the final three subsections, we discuss the importance of analyzing past impacts as part of the cumulative impacts analysis, incorporating future projects into the cumulative impacts analysis, and determining the geographic scope for considering relevant impacts. After discussing these components, we make recommendations to improve cumulative impacts analyses within the existing legal frameworks, as well as suggest broader legislative changes to the statutes themselves.

A. *"Like Projects" v. "Like Impacts"*

1. *NEPA and CEQA*

The courts have interpreted NEPA and CEQA to require agencies to assess impacts from all types of projects within the geographic scope of a project proposal. For example, courts should find an impact analysis for a proposed oil platform that discusses categorically similar oil and gas activities, but not fishing, coastal development, or shipping activities, inconsistent with the "like impacts" requirements of NEPA and CEQA.

In 2006, the City of Carlsbad, California certified a Final EIR (FEIR) for a proposed desalination plant within its city limits.[77] The FEIR's cumulative impacts section analyzed the cumulative effects of the proposed desalination plant on marine biological resources in combination with seven other planned desalination plants, but did not mention or analyze any other past, present, or future projects that might have cumulative impacts on marine biological resources.[78] The *Carlsbad* analysis for marine impacts contains only

76. *See* Section IV.A, *infra* (discussing "Like Projects" v. "Like Impacts").

77. CITY OF CARLSBAD, PRECISE DEVELOPMENT PLAN AND DESALINATION PLANT PROJECT FINAL IMPACT REPORT (EIR 03-05) 5-10 (2006), *available at* http://tinyurl.com/jvlnf32.

78. *Id.* § 5.3.

"like projects" that are categorically similar.[79] This approach fails to address how cumulative effects can result from a combination of different categories of projects.[80]

Considering only categorically similar projects is inconsistent with both NEPA and CEQA's requirements to assess similar impacts from all types of projects relevant to the particular ecosystem under analysis. Pursuant to NEPA, both EAs and EISs must include brief discussions of the cumulative impacts of a project, defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions."[81] This provision does not single out effects from only related like-kind projects; instead it encompasses any impacts that may cause a cumulative effect regardless of the type or nature of the projects generating such impacts.[82] CEQA more explicitly explains that a proposed project's impacts are "cumulatively considerable" if they are significant "when viewed in connection with the *effects* of past projects, the *effects* of other current projects, and the *effects* of probable future projects."[83] Thus, CEQA requires an analysis of *all effects* that might be cumulative, not merely those generated by related projects.[84]

2. *Recommendations going forward*

In light of NEPA and CEQA's broad statutory language requiring analysis of all related effects, agencies should ensure that they identify all past, present, and future projects causing effects relevant to the proposed project, not just categorically similar projects.[85]

79. *Id*.

80. Halpern et al., *supra* note 1, at 948-52; *see also* Figure 2, *supra*. This is because, for example, other categories of projects can produce similar stressors or may produce different stressors that can directly or indirectly impact the ecological system, creating cumulative impacts.

81. *See* 40 C.F.R. § 1508.7 (2014).

82. *See id*. § 1508.8.

83. CAL. CODE REGS. tit. 14, § 15064(h)(1) (2014) (emphasis added).

84. *Id*.

85. Some courts re-emphasized this broader, more encompassing analysis. *See, e.g.*, City of Carmel-by-the-Sea v. U.S. Dep't of Transp., 123 F.3d 1142, 1160 (9th Cir. 1997) (In reviewing the Final Environmental Impact Statement/Report for a proposed realignment of California State Highway 1 through Carmel-By-The-Sea, California, the Ninth Circuit found that "[t]he Final Environmental Impact Statement/Report fail[ed] to both catalogue adequately past projects in the area, and to provide any useful analysis of the cumulative impact of past, present and future projects and the Hatton Canyon freeway on the wetlands,

Federal agencies responsible for preparing EISs already consult with other agencies about project impacts and past projects,[86] but

> are not required to list or analyze the effects of individual past actions unless such information is necessary to describe the cumulative effect of all past actions combined. . . . Generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.[87]

In California, "CEQA also does not require agencies to catalogue or exhaustively list or analyze all individual past actions."[88] However, federal and state agencies can improve the transparency of their review by including lists of relevant effects from other past, current, and future projects within EISs and EIRs rather than only listing the projects themselves.[89] By identifying both a list of projects and those projects' effects relevant to the proposed project's impacts, the public, project applicants, and the agencies will all have a better understanding of the relationship between impacts and the variety of projects and stressors that may produce those related impacts. The analyses will also more successfully focus on related effects, rather than similar types of projects.

There may be additional resources that can streamline agencies' access to data on past, present, and future projects with related impacts.[90] Clearinghouses, allowing public access to environmental

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Monterey pine and Hickman's onion.").

86. Under NEPA, lead agencies must request assistance from other federal agencies with jurisdiction by law or expertise in an environmental issue as "cooperating agencies." 40 C.F.R. § 1501.6 (2014). The Council on Environmental Quality recommends that the lead agency's first step in identifying cumulative impacts should be to investigate its other project plans and the plans of "other agencies in the area." CEQ Cumulative Effects Guidance, *supra* note 17, at 19. Under CEQA, agencies must also consult with other state and federal agencies about the proposed project's impacts. CAL. CODE REGS. tit. 14, §§ 15063(g), 15083, 15086 (2014).

87. Memorandum from James L. Connaughton, Chairman, Council on Envt'l Quality, to Heads of Federal Agencies 2 (June 24, 2005), *available at* http://tinyurl.com/mcqac9n [hereinafter Connaughton Memorandum].

88. COUNCIL ON ENVTL. QUALITY & CAL. OFFICE OF PLANNING AND RESEARCH, DRAFT NEPA AND CEQA: INTEGRATING STATE AND FEDERAL ENVIRONMENTAL REVIEWS 31 (2013).

89. NEPA and CEQA already require this. *See City of Carmel*, 123 F.3d at 1160; Kings Cnty. Farm Bureau v. City of Hanford, 221 Cal. App. 3d 692, 728-29 (1990). However, agencies using the "list" approach frequently omit the second step, i.e., fail to analyze the *impacts* of the listed projects. As a result, there is a disconnect between the list and the analysis.

90. Zhao Ma et al., *Barriers to and Opportunities for Effective Cumulative Impact*

review documents, are one such resource. At present, all federal agencies are required to contribute draft and final EISs to the U.S. Environmental Protection Agency (U.S. EPA) for posting to the NEPA EIS Database and to publish notice that the draft or final EIS is available for public comment.[91] California's state clearinghouse provides access to more environmental review document types than does the NEPA EIS Database, including EIRs, Negative Declarations, and EISs completed by state agencies since 1990; however, this clearinghouse does not include what are known as Functional Equivalent Program (FEP)[92] documents or local government CEQA documents and accordingly leaves a large gap in regulatory knowledge.[93] Another challenge is that both clearinghouses are organized by project or responsible agency, not by impact type.[94] As a result, finding past CEQA documents on the clearinghouses that may be relevant to cumulative impacts can be extremely difficult; clearinghouse users would need at least some knowledge of how activities can affect the physical environment to identify documents that are potentially relevant to a cumulative impacts analysis. Thus, while helpful to a point, document clearinghouses have their limitations and often include clunky search engines, incomplete information, and lack of cross-jurisdictional documentation.

One way to supplement agency access to information on existing projects and infrastructure would be to encourage or require project applicants to utilize GIS software, Google Earth, or other free or open source mapping programs to identify existing and planned development within a relevant geographic scope of the proposed project.[95] By requiring applicants to provide certain project details to facilitate the development of a map layer that is publicly available

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Assessment Within State-Level Environmental Review Frameworks in the United States, 55 J. ENVTL. PLAN. & MGMT. 961, 961–78 (2012).

91. *See* 40 C.F.R. § 1506.10 (2014); *Envtl. Impact Statement (EIS) Database*, U.S. ENVTL. PROT. AGENCY, http://tinyurl.com/4x8wtj9 (last visited Jan. 5, 2014).

92. For a description of California's certified FEPs—those programs the state has determined are exempt from the CEQA review process because they have their own environmental impact review process which is "functionally equivalent" to CEQA, see FEP Supplement, *supra* note 46.

93. *See CEQAnet Database*, CAL. GOVERNOR'S OFFICE OF PLANNING & RESEARCH, http://tinyurl.com/lhnxp6m (last visited Apr. 20, 2014); CAL. CODE REGS. tit. 14, § 15205 (2014).

94. *See* CAL. GOVERNOR'S OFFICE OF PLANNING & RESEARCH, *supra* note 93 (providing a database which can be searched by Project Location, Lead Agency, Reviewing Agency, or Document Type); EPA, *supra* note 91.

95. Recently, in *Sierra Club v. Superior Court*, 302 P.3d 1026, 1035 (Cal. 2013), the California Supreme Court held that GIS-formatted data must be disclosed under the Public Records Act.

as part of a permitting process, agencies could begin creating an infrastructure map that would illustrate the human activity or impact landscape of proposed development. If applicants included key information about the proposed project, agencies would have clear directions about which fellow agencies to contact for additional detail, where the relevant environmental review documents are available, and potentially even information on neighboring project footprints and impacts.

Another potential resource for agencies looking to identify and analyze related impacts, as opposed to related projects, are public data portals. In recent years, the federal government and several states have invested in data-sharing initiatives to improve agency and public access to a wide variety of authoritative data, including marine-specific data.[96] Two examples of data sharing include the State of California Coastal Geoportal[97] and the West Coast Ocean Data Portal.[98] Unlike clearinghouses, these data portals tend to include geospatial data resources visualizing information that is not necessarily linked to a specific project. For example, the California Coastal Geoportal includes data layers visualizing the locations of marine protected areas, kelp habitat, and tsunami zones.[99] These types of data resources can be invaluable to project applicants and agencies once they have identified the existing "impact landscape" as well as likely impacts of a proposed project to further understand the geographic scope of impacted resources.

Prompting agencies to list like effects instead of related projects in their cumulative impacts assessment remains the best first step towards improved analysis. In addition, the White House Council on Environmental Quality encourages federal agencies to also consider the additive and interactive nature of those effects, including countervailing and synergistic impacts.[100] Many environmental risk assessments and impact models currently assume that cumulative

96. *See, e.g.*, DATA.GOV, http://tinyurl.com/mbnanh6 (last visited Apr. 20, 2014); *State of California Geoportal*, CAL. DEP'T OF TECH., http://tinyurl.com/bw4jqcf (last visited Apr. 20, 2014).

97. *Id*.

98. WEST COAST OCEAN DATA PORTAL, http://tinyurl.com/pjafa9q (last visited Apr. 20, 2014).

99. S*ee generally Gallery*, CAL. DEP'T OF TECH., http://tinyurl.com/mb5mhkh (last visited May 20, 2014).

100. CEQ Cumulative Effects Guidance, *supra* note 17, at vii. "Countervailing effects" are the same as "antagonistic effects" as used by the scientific community and described above in Section II.

impacts are only additive because levels of interactive effects are mostly unstudied.[101] Absent scientific guidance on which stressors interact additively, synergistically, or antagonistically, using an additive approach to analyzing cumulative effects currently represents the best available science. However, in instances where synergistic or antagonistic relationships have been discovered, these relationships should be incorporated into a cumulative impacts analysis.[102]

Another method agencies can use to better characterize cumulative effects is to enumerate the number, type, frequency, and magnitude of impacts to individual ecological components within the impact assessment documents. For example, impacts to the marine environment from a power plant would include entrainment of larvae, increased water temperature, terrestrial habitat loss due to the building footprint, and habitat loss in the ocean due to intake and outflow.[103] As ongoing research expands our understanding of how impacts interact and scientists are able to offer better guidance on how to analyze cumulative impacts, agencies can use publically available mapping tools and document clearinghouses to identify effects and incorporate these more complex interactions when assessing cumulative effects on the marine environment. However, starting with a transition from analyzing related projects to like effects is an effective and actionable first step.

B. *Selecting a Proper Baseline for Cumulative Impacts Analysis*

The following subsection examines the temporal components of establishing a baseline, while the succeeding two subsections examine how the courts interpret baseline requirements under NEPA and CEQA. An agency determines significance in part by assessing the baseline physical environmental conditions in proximity to the proposed project.[104]

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101. *See, e.g.*, CANADIAN SCIENCE ADVISORY SECRETARIAT RESEARCH DOCUMENT, AN ECOLOGICAL RISK ASSESSMENT FRAMEWORK (ERAF) FOR ECOSYSTEM-BASED OCEANS MANAGEMENT IN THE PACIFIC REGION (2012); Benjamin S. Halpern et al., *Mapping Cumulative Human Impacts to California Current Marine Ecosystems*, 2 CONSERVATION LETTERS 138, 139 (2009).

102. *See, e.g.*, Figure 2, *supra* (detailing the synergistic relationship between temperature and nutrient enrichment).

103. Entrainment and increased water temperature would occur daily for the life of the project, terrestrial habitat loss would occur during construction of the project, and ocean habitat loss would occur once the project is in place.

104. *See* CAL. CODE REGS. tit. 14, § 15125(a) (2014).

1. *Temporal components of selecting a baseline*

Identifying the appropriate project baseline is critical because if the baseline is over- or under-inclusive, it can skew the significance determination for the proposed project and its alternatives.[105] If, for example, the lead agency does not accurately assess existing degradation of the project area, it might conclude that the environment has the capacity and resilience to withstand a greater impact from a proposed project than it actually does. The three general approaches for baseline selection, respectively known as "historical baseline,"[106] "existing conditions baseline,"[107] and "future conditions baseline,"[108] each have distinct consequences on impact analysis. The legal adequacy or scientific fidelity of each approach varies depending on the circumstances.

Generally, scientists recommend a historical approach to setting a baseline because smaller data sets often fail to capture the full picture of ecosystem decline or recovery. It is easier to evaluate the total consequences of human activity in comparison to the environment "when the environmental attribute (or 'resource,' for brevity) was most abundant."[109] Analyses of historical data concerning marine populations "frequently reveal more drastic declines than can be seen with short-term observations alone."[110] For instance, McClenachan et al. analyzed global populations of green turtles and found that historical data revealed an over eighty percent population decline, whereas "similar comparisons in locations where data are only available over periods of [less than

105. *See* Citizens for E. Shore Parks v. Cal. State Lands Comm'n, 136 Cal. Rptr. 3d 162, 171 (Cal. Ct. App. 2011) ("[A]n inappropriate baseline may skew the environmental analysis flowing from it, resulting in an EIR that fails to comply with CEQA."); *see also* Cherry Valley Pass Acres & Neighbors v. City of Beaumont, 118 Cal. Rptr. 3d 182, 197 (Cal. Ct. App. 2010) ("Without an appropriate baseline description, an adequate analysis of a project's impacts, mitigation measures, and alternatives 'becomes impossible.'") (quoting Cnty. of Amador v. El Dorado Cnty. Water Agency, 91 Cal. Rptr. 2d 66, 80 (Cal. Ct. App. 1999)).

106. *See Cherry Valley*, 118 Cal. Rptr. at 198-99; U.S. ENVTL. PROT. AGENCY, CONSIDERATION OF CUMULATIVE IMPACTS IN EPA REVIEW OF NEPA DOCUMENTS 15 (1999), *available at* http://tinyurl.com/lruszh5 [hereinafter EPA Guidance].

107. *See* CAL. CODE REGS. tit. 14, § 15125(a) (2014); *see also* CEQ Cumulative Effects Guidance, *supra* note 17, at 31.

108. *See* CAL. CODE REGS. tit. 14, § 15125(e) (2014).

109. Lance N. McCold & James W. Saulsbury, *Including Past and Present Impacts in Cumulative Impact Assessment*, 20 ENVTL. MGMT 767, 768 (1996).

110. Loren McClenachan et al., *From Archives to Conservation: Why Historical Data are Needed to Set Baselines for Marine Animals and Ecosystems,* 5 CONSERVATION LETTERS 349-50 (2012).

thirty] years show net population increases approaching [thirty percent,]" indicating a shifting baseline.[111]

These discrepancies result from population and environmental variability over time. Because populations may alternate between periods of decline and periods of stable or increasing abundance, it can be difficult to understand overall population trends based on a population analysis over a short timeframe.[112] However, challenges to using historical baselines include a lack of available historical data in certain geographies and uncertainty with some available historical data.[113] There are options to address these challenges, which are discussed further in the recommendations for agency implementation of baseline below.

The second general approach is the existing conditions baseline, which both NEPA and CEQA generally require.[114] An existing conditions baseline is a "snapshot" of current environmental conditions without reference to how that environment has changed over time. The existing conditions baseline has two shortcomings. First, an existing conditions baseline subsumes all past projects that have been assessed (e.g., a coastal desalination plant that was permitted five years ago) into the baseline.[115] In other words, the environmental condition today, with all current uses and impacts in play, is the baseline from which agencies assess any additional environmental impacts that may flow from the project proposal under consideration. Second, if there are impacts in the project area that have never been assessed (e.g., illegal activities[116] or activities that pre-date NEPA and CEQA enactment[117]), the existing conditions

111. *Id*. at 350. This discrepancy is not limited to green turtles. McClenachan et al. also used historical data to show that blue shark populations have declined by 97%, which is 2.5 times greater than scientists could have predicted using catch data from 1978 to 1999. *Id*. at 351.

112. *See id*. at 353.

113. Peter S. Alagona, John Sandlos & Yolanda F. Wiersma, *Past Imperfect: Using Historical Ecology and Baseline Data for Conservation and Restoration Projects in North America*, 9 ENVTL. PHIL. 49, 54 (2012).

114. CEQ Cumulative Effects Guidance, *supra* note 17, at 1; CAL. CODE REGS. tit. 14, § 15125(a) (2014).

115. In other words, if the existing environment is severely degraded, it is more likely that the new impact will be considered cumulatively. *See generally* Cmtys. for a Better Env't v. Cal. Res. Agency, 126 Cal. Rptr. 2d 441 (Cal. Ct. App. 2002).

116. *See* Riverwatch v. Cnty. of San Diego, 91 Cal. Rptr. 2d 322, 338 (Cal. Ct. App. 1999) (project proponents who wished to use their property for a quarry project had previously used one area of their property as a sand mine without gaining CEQA approval); *see also* Custer Cnty. Action Ass'n v. Garvey, 256 F.3d 1024, 1040 (10th Cir. 2001).

117. *See* Citizens for Eastshore Parks v. Cal. State Lands Comm'n, 136 Cal. Rptr. 3d 162, 168 (Cal. Ct. App. 2011).

approach grandfathers those impacts into the baseline by incorporating their presence into the existing conditions used to evaluate the proposed project and its alternatives. Thus, an existing conditions baseline can allow significant impacts to escape review by creating the impression that previously un-assessed impacts were actually permitted (rather than overlooked) and appropriately mitigated. The existing conditions approach simply sweeps those impacts into the existing state of the environmental "snapshot." These challenges inherently create what are known across scientific disciplines as "shifting baselines,"[118] where each subsequent project proposal benefits from a baseline that has shifted with existing conditions. Under this scenario, agencies can overlook prior impacts that were either unforeseen or greater (collectively or in isolation) than predicted. One solution to this issue is to designate a "static" baseline.

In limited circumstances, such as when a project will not begin operations until many years after approval, agencies may also use expected future conditions as the baseline. This third approach may be utilized for projects such as those that are likely to affect future traffic patterns because population and traffic typically expand over time.[119] By incorporating future development as if it has already occurred into the baseline, a proposed project's impacts on the environment may seem less significant than if the agency conducting the assessment had used a historical or existing conditions baseline.[120] This is because the discrepancy between the baseline level of impacts and the proposed project's predicted impacts will be smaller. In contrast, where a proposed project will mitigate predicted future impacts from other activities (e.g., a proposed mass transit project that will mitigate expected future increases in emissions due to increased population and traffic in the future), a future conditions baseline may more accurately reflect a project's future environmental impacts (both beneficial and detrimental).

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118. *See* supra note 19 and accompanying text.

119. *See, e.g.*, Neighbors for Smart Rail v. Exposition Metro Line Constr. Auth., 304 P.3d 499, 518-19 (Cal. 2013), where the opponents to a light rail transit line project claimed the project applicant's EIR was deficient.

120. Because of this, the agency must show that substantial evidence exists both to support the use of a future baseline and to justify why using an existing conditions baseline would be uninformative or misleading. *Id*. at 512-13.

Baseline Type	Definition	Applicability
Historic	The resource abundant environmental situation.	The scientifically preferred categorization of baseline. An agency has sufficient discretion to select a historic baseline so long as the agency justifies its use.
Existing	The current environmental situation, including existing degradation.	The norm in CEQA and NEPA practice. An agency must justify deviation from this norm. Courts are most familiar with this approach.
Future	The future environmental situation if the project did not happen.	Despite case law controversy, science would support the use of this approach in certain circumstances.

Table 3. Three-part typology for temporal baseline selection

There are limitations to each of the three baseline characterizations. Different baseline approaches may be appropriate for different factual circumstances. One solution to this complex decision landscape is for agencies to choose the baseline most appropriate for the situation, where "most appropriate" is based on scientifically derived ecological principles. The following sections outline current NEPA and CEQA requirements and case law in order to further illustrate their approaches to baselines and discuss how agencies can better ground their determination of baselines in science.

2. *Baseline under NEPA*

NEPA regulations clarify that the "'no action' alternative may be thought of in terms of continuing with the present course of action until that action is changed."[121] This "no action" alternative is typically synonymous with the existing conditions baseline.[122] Yet courts are still faced with interpreting whether the "no action" alternative also includes impacts from illegal activities that avoided environmental review, the proposed project's impacts, or the impacts from a proposed project renewal.

Even when the current level of activity includes past illegal activities that may not have received environmental analysis, circuit courts have upheld agency analyses of the status quo, or existing conditions.[123] For example, in *Custer County Action Association v. Garvey,* the Tenth Circuit rejected a claim by the Custer County Action Association that certain past airspace use was unlawful, and therefore "inappropriately included" in the assessment of the military's current airspace.[124] The court found that the Federal Aviation Administration (FAA) and Air National Guard (ANG)

121. Ass'n of Pub. Agency Customers v. Bonneville Power Admin., 126 F.3d 1158, 1188 (9th Cir. 1997) (citing Forty Most Asked Questions Concerning CEQA's National Environmental Policy Act Regulations, 46 Fed. Reg. 18,026, 18,027 (May 23, 1981)). It is worth noting that the Fourth Circuit Court of Appeals called the "no action" alternative the "no build" alternative, which it compared to the baseline. *See generally* N.C. Wildlife Fed'n v. N.C. Dep't of Transp., 677 F.3d 596 (4th Cir. 2012). However, referring to the "no action" alternative as the "no build" alternative is a mischaracterization because courts generally equate the "no action" alternative with the "status quo," which may include project renewals. *See Ass'n of Pub. Agency Customers*, 126 F.3d at 1188 and further discussion in this section.

122. *See generally* NAT'L. OCEANIC & ATMOSPHERIC ADMIN., GUIDANCE ON CUMULATIVE EFFECTS ANALYSIS IN ENVIRONMENTAL ASSESSMENTS AND ENVIRONMENTAL IMPACT STATEMENTS (2012), *available at* http://tinyurl.com/lx5dcn8 [hereinafter NOAA Guidance].

123. See e.g., *Custer Cnty. Action Ass'n*, 256 F.3d at 1040.

124. *Id*.

adequately considered the "no action" alternative by comparing the proposals to the status quo: flying existing routes in existing areas.[125] The court noted "[t]he requirement to consider a no[] action alternative does not provide Petitioners a vehicle in which to pursue allegations that past ANG or FAA actions received insufficient environmental analysis. The time has passed to challenge past actions."[126] Here, the "no action" alternative entails agency analysis of the status quo, or existing conditions, regardless of whether those existing conditions include past illegal activities that received inadequate environmental analysis.

While the Ninth Circuit struck down agency inclusion of a *newly proposed* project in the "no action" alternative,[127] it has upheld agency inclusion of project *renewals* in the "no action" alternative.[128] For example, in *American Rivers v. Federal Energy Regulatory Commission*, the Ninth Circuit considered a project *renewal* for two hydroelectric projects under the Federal Powers Act and allowed the Federal Energy Regulatory Commission's (FERC) FEIS to define "the 'no action' alternative as the existing projects as 'operate[d] under the terms and conditions of their original licenses.'"[129] The court reasoned that no action on the relicensing application "would have been to permit [the project] to continue operating . . . indefinitely subject to the terms and conditions of its expired original license."[130] Arguably, this case established a limited precedent in the Ninth Circuit that a proposed project's impacts may be part of the "no action" alternative if the activity is already occurring and will continue to occur independent of the proposal's approval.

Despite NEPA's focus on the "no action" alternative as an existing conditions baseline, federal agencies rely on the Council on Environmental Quality's guidelines and methodologies to create agency specific guidance on how to establish the baseline.[131] In

125. *Id*.

126. *Id*.

127. *See* Friends of Yosemite Valley v. Kempthorne, 520 F.3d 1024, 1038 (9th Cir. 2008), where the Ninth Circuit held the supplemental environmental impact statement for a *revised* plan invalid under NEPA because the "no action" alternative included a *previous* plan that the Ninth Circuit had held illegal. The Ninth Circuit explained that it would be improper to include elements from this previously held invalid plan as part of the status quo when they had not yet been implemented and were instead part of the very plan being proposed.

128. *See* Am. Rivers v. Fed. Energy Regulatory Comm'n, 201 F.3d 1186, 1192 (9th Cir. 1999).

129. *Id*.

130. *Id*. at 1200.

131. CEQ Cumulative Effects Guidance, *supra* note 17, at 1.

beach nourishment projects, for example, the U.S. Army Corps of Engineers sets the baseline by establishing the past condition at the beginning of the timeframe selected, using historical trends for the area.[132] The National Oceanic and Atmospheric Administration (NOAA) states that the baseline should reflect a historical reference time and can also refer to anticipated future conditions.[133] The U.S. EPA[134] also encourages use of an environmental reference point, stating that

> [i]n analyzing environmental impacts, this environmental reference point would not necessarily be an alternative. Instead, it would serve as a benchmark in assessing the environmental impacts associated with each of the alternatives. Specifically, the analysis would evaluate the degree of degradation from the environmental reference point (i.e., natural ecosystem condition) that has resulted from past actions. Then the relative difference among alternatives would be determined for not only changes compared to the existing condition but also changes critical to maintaining or restoring the desired, sustainable condition.[135]

From a public policy perspective, these agency options are desirable because they allow for deviation from an existing conditions baseline in instances where doing so will provide a better assessment of the environmental impacts from a proposed action or its alternatives.

3. *Baseline under CEQA*

CEQA's requirements for determining a baseline are ambiguous and widely disputed. The controversy centers on competing interpretations of the phrases "as they exist at the time" and "normally" in section 15125 of the CEQA regulations, which states

> [a]n EIR must include a description of the physical environmental

132. *See Beach Nourishment: A Guide for Local Government Officials*, NAT'L. OCEANIC & ATMOSPHERIC ADMIN., http://tinyurl.com/krzk4ru (last visited Apr. 20, 2014). NOAA prepared a web page forum of the cumulative impact methodologies used by federal agencies in beach nourishment projects as part of an initiative to improve assessments associated with beach nourishment projects.

133. NOAA Guidance, *supra* note 122, at 26.

134. *See* EPA Guidance, *supra* note 106, at 15.

135. *See id*. The EPA also specifies that if agency members use the "no action" alternative, they should ensure that it incorporates the cumulative effects of past activities. *Id*.

> conditions in the vicinity of the project, *as they exist at the time* the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced, from both a local and regional perspective. This environmental setting will *normally* constitute the baseline physical conditions by which a lead agency determines whether an impact is significant.[136]

The phrase "as they exist at the time the notice of preparation is published, or . . . at the time environmental analysis is commenced" establishes the requirement for an existing conditions baseline, [137] but the term "normally" allows agencies some flexibility "to deviate from the time-of-review baseline."[138] Ultimately, the general rule under CEQA, which the following cases illustrate, is that baseline should usually be existing conditions, but, agencies have the discretion to look to past and future impacts in interpreting existing conditions. Moreover, in limited circumstances, agencies may use a future conditions baseline if "justified by unusual aspects of the project or the surrounding conditions."[139]

California courts have long struggled over "tricky baseline questions."[140] This struggle is particularly evident where a project is already permitted and an agency is conducting the environmental review process for a new project component or modification.[141] In these cases, courts have vacillated over whether project-related changes should be measured against what is currently actually happening—the "existing conditions" at the time the environmental review is commenced—or what is allowed to happen—the operationally allowed maximum conditions based on a project's previous permit approval or as defined by a plan or regulatory

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136. CAL. CODE REGS. tit. 14, § 15125(a) (2014) (emphasis added). The "no project" alternative (equivalent to the "no action" alternative under NEPA) "is not the baseline for determining whether the proposed project's environmental impacts may be significant, unless it is identical to the existing environmental setting analysis which does establish that baseline." *Id*. § 15126.6(e)(1).

137. *See id*. § 15125 (a).

138. *See, e.g.*, Fat v. Cnty. of Sacramento, 119 Cal. Rptr. 2d 402, 406-07 (Cal. Ct. App. 2002) (noting that the standard of review for abuse of agency discretion is substantial evidence); *see also* Cherry Valley Pass Acres and Neighbors v. City of Beaumont, 118 Cal. Rptr. 3d 182, 196-97 (Cal. Ct. App. 2010) ("In using the word 'normally,' section 15125, subdivision (a) of the Guidelines necessarily contemplates that physical conditions *at other points in time* may constitute the appropriate baseline or environmental setting.").

139. Neighbors for Smart Rail v. Exposition Metro Line Constr. Auth., 304 P.3d 499, 508 (Cal. 2013).

140. *See Fat*, 119 Cal. Rptr. 2d at 407 (internal quotation marks omitted).

141. *See* Cmtys. for a Better Env't v. S. Coast Air Quality Mgmt. Dist., 226 P.3d 985, 989 (Cal. 2010).

framework.[142] In *Communities for a Better Environment v. South Coast Air Quality Management District*, the California Supreme Court tried to bring some clarity to this issue, but courts continue to struggle with how to deal with operational variability as it pertains to baseline.[143] In *Communities*, the project proponent sought a permit modification to add a new industrial process at its refinery.[144] By comparing the new process' impact to the maximum permitted operating capacity of the refinery, rather than the much lower actual operating levels of the refinery when the environmental analysis began, the project proponent concluded that the new project had no significant impact.[145] The California Supreme Court held that measuring the baseline using a permittee's maximum *permitted* emissions limitations rather than the *actual* existing discharge or emission of pollutants was improper.[146] The Court reasoned that "[b]y comparing the proposed project to what *could* happen, rather than to what was actually happening, the District set the baseline not according to 'established levels of a particular use,' but by 'merely hypothetical conditions allowable' under the permits."[147] To hold otherwise, the Court continued, would lead to illusory comparisons and would "mislead the public as to the reality of the [project's] impacts."[148]

While affirming the use of an existing conditions baseline rather than a baseline based on the maximum allowed operational limits, the Supreme Court maintained that agencies have discretion and flexibility in determining how to measure the existing baseline.[149] The Court explicitly allowed for scenarios in which past and future conditions (e.g., seasonal variation, recurring periods of high or low activity, etc.) can be accounted for as part of the existing conditions baseline in order to more accurately predict what the conditions will be when the project is approved.[150] It noted that "[n]either CEQA nor the CEQA Guidelines mandates a uniform, inflexible rule

142. *See id*. at 993 n.6-7, 996 n.11.

143. *Id*. at 989.

144. *Id*. at 990-91.

145. *Id*.

146. *Id*. at 993.

147. *Id*. at 994 (quoting San Joaquin Raptor Rescue Ctr. v. Cnty. of Merced, 57 Cal. Rptr. 3d 663, 674 (Cal. Ct. App. 2007)).

148. *Id*. at 994.

149. *Id*. at 997.

150. *Id*. at 997. In particular, the Court wants to avoid incentivizing project proponents to temporarily and artificially increase operations in order to establish a higher baseline.

for determination of the existing conditions baseline. Rather, an agency enjoys the discretion to decide . . . exactly how the existing physical conditions without the project can most realistically be measured."[151]

Post-*Communities*, California courts have relied on this reasoning to uphold agency discretion in questions concerning actual usage versus permitted usage and the inclusion of past and future conditions in the measurement of existing conditions baseline. Within months of the *Communities* decision, the California Court of Appeal upheld an agency's use of a maximum permitted allowance based on past water use as an appropriate baseline.[152] The project at issue in *Cherry Valley Pass Acres and Neighbors v. City of Beaumont* was a proposed residential development on a 200-acre site traditionally used as an egg farm, until late 2005 when it was converted to a cattle ranch.[153] Prior to the conversion from egg farm to cattle ranch, several parties with claims to the underlying water basin engaged in a lawsuit to settle their water rights.[154] In a 2004 stipulated judgment, the use of 1,484 acre-feet per annum (afa) of water was allocated to the owners of the area at issue.[155] This 2004 permitted use of 1,484 afa was based on a rolling average of the water previously drawn from the basin.[156] By late 2005, the egg farm, which required approximately 1,340 afa to operate, had been converted to a cattle ranch that required significantly less water, approximately fifty afa to operate.[157] During the environmental review process for the proposed residential project, the reviewing agency established the 2004 adjudicated right to draw 1,484 afa of groundwater from the basin as the baseline for the project, rather than the fifty afa the landowners actually used for the existing cattle ranch.[158] Neighbors of the land challenged this 1,484 afa baseline, arguing that it overstated the current usage and, therefore, understated the residential development's potential effects.[159] The "worst case" water usage scenario for the residential development

151. *Id*.

152. Cherry Valley Pass Acres and Neighbors v. City of Beaumont, 118 Cal. Rptr. 3d 182, 196-200 (Cal. Ct. App. 2010). Although both cases were published in 2010, *Communities* preceded *Cherry Valley Pass* by a few months.

153. *Id*. at 186-91.

154. *Id*. at 191.

155. *Id*. at 193.

156. *Id*. at 192.

157. *Id*. at 191.

158. *Id*. at 196.

159. *Id*.

was 531 afa.[160]

The Court of Appeal held that the 1,484 afa baseline was an appropriate "discretionary determination of how the 'existing physical conditions without the project' could 'most realistically be measured.'"[161] This conclusion seems to contradict the Supreme Court's reasoning in *Communities* that actual use, not permitted use, serve as the existing conditions baseline. However, the *Cherry Valley Pass* court noted that the project proponent's water entitlement "was not a hypothetical or allowable condition, but a condition that existed on the ground . . . well before the notice of preparation was published."[162] This is one instance where a lower California court reinforced agency discretion by upholding use of an existing baseline measured using past conditions.

As with NEPA's "no action" alternative baseline, CEQA's existing conditions baseline grandfathers in activities (and their impacts) that may not have received sufficient environmental analysis. In *Citizens for East Shore Parks v. California State Lands Commission*, the California Court of Appeal upheld the California State Lands Commission's inclusion of the operations of a marine terminal used to transport oil as part of the existing conditions baseline in an EIR, even though the terminal's operations pre-dated CEQA and had thus never received environmental impact scrutiny.[163] In a similar vein, the Court of Appeal upheld including existing *illegal* activities (activities that had per se avoided environmental review requirements) as part of the baseline in *Riverwatch v. County of San Diego*.[164] The court found that "in general[,] preparation of an EIR is not the appropriate forum for determining the nature and consequences of prior conduct of a project applicant."[165] Specifically, "[h]ow present conditions come to exist may interest enforcement agencies, but that is irrelevant to CEQA baseline determinations—even if it means preexisting development will escape environmental review under CEQA."[166] Thus, agencies are not required to go back and analyze illegal or previously unanalyzed projects as part of their

160. *Id*.

161. *Id*. at 197.

162. *Id*. at 198.

163. Citizens for E. Shore Parks v. Cal. State Lands Comm'n, 136 Cal. Rptr. 3d 162, 174 (Cal. Ct. App. 2011).

164. Riverwatch v. Cnty. of San Diego, 91 Cal. Rptr. 2d 322, 326 (Cal. Ct. App. 1999).

165. *Id*. at 338.

166. *Citizens for East Shore Parks*, 136 Cal. Rptr. 3d at 172 (interpreting *Riverwatch,* 91 Cal. Rptr. 2d at 322).

baseline determination.[167] However, agencies have discretion to consider these past activities when setting baseline, and it is a best practice to do so from a scientific perspective. Borrowing from the Supreme Court's reasoning in *Neighbors for Smart Rail*, analyzed below, an agency could likely justify departure from the norm of using the existing conditions baseline and instead focus on a historical baseline if there are unusual aspects of the project or surrounding circumstances and a historic baseline "promotes public participation and more informed decisionmaking by providing a more accurate picture of a proposed project's likely impacts."[168]

Although California courts have been reluctant to address historical conditions in establishing baseline separately from the existing conditions baseline, in *Neighbors for Smart Rail* the Supreme Court recently re-evaluated the question of incorporating future conditions, and its holding grants agencies more flexibility when determining baseline.[169] The Supreme Court held that agencies do have the discretion to incorporate analysis of future conditions into the baseline, including conditions that will exist when the proposed project begins operations.[170] However, the standard for incorporating future conditions differs depending on whether or not the agency is also examining the project's impact on existing conditions. The court clarified that the "norm" is an existing conditions baseline, which may also incorporate future conditions.[171] Where the agency chooses to forego analysis of existing conditions, it must justify that the departure from the "'norm[]' . . . promotes public participation and more informed decisionmaking by providing a more accurate picture of a proposed project's likely impacts."[172] In addition, there must be "unusual aspects of the project or the surrounding conditions."[173] It is

167. However, agencies are nonetheless required to analyze *past*, present, and future impacts, so they must list or summarize these past activities as a part of that analysis. CAL. CODE REGS. tit. 14, § 15355 (2012).

168. *See* Neighbors for Smart Rail v. Exposition Metro Line Constr. Auth., 304 P.3d 499, 508-10 (Cal. 2013).

169. Notably, this opinion disapproved of pre-existing precedent in *Madera Oversight Coalition, Inc. v. Cnty. of Madera*, 131 Cal. Rptr. 3d 626 (Cal. Ct. App. 2011), and *Sunnyvale W. Neighborhood Ass'n v. City of Sunnyvale City Council*, 119 Cal. Rptr. 3d 481 (Cal. Ct. App. 2010), where the Court of Appeal held that agencies could not incorporate predicted growth expected to occur on a date subsequent to the certification of the EIR. *See Neighbors for Smart Rail*, 304 P.3d at 507-08.

170. *Id*. at 509.

171. *Id*. at 510.

172. *Id*.

173. *Id*. at 508.

insufficient "[t]hat the future conditions analysis would be informative."[174]

In summary, there are three potential baselines from which a project's impact can be measured, and federal and state courts and agencies have interpreted baseline selection requirements under NEPA and CEQA in various ways, depending on the circumstances surrounding the proposed project. First, the U.S. EPA encourages the use of a historic baseline,[175] but no federal or state courts or agencies have *required* this approach. While agencies do have discretion to select a historic baseline, they have to justify that decision from both a scientific and a technical perspective; moreover, project proponents are likely to argue against this approach because it is more difficult to establish than an existing conditions baseline. Second, the existing conditions baseline is the legal norm under both CEQA and NEPA, but it does not always accurately capture the scientific reality of either past environmental degradation or future environmental improvement in the absence of a permitted project.[176] Finally, the California Supreme Court has allowed agency flexibility to choose a future operations baseline under CEQA—measuring the project's impacts against what the project region would look like without the project at some future date—but only where it is justified by unusual circumstances.[177]

4. *Recommendations going forward*

Selecting the appropriate baseline is all about "context dependency," with the chosen baseline providing the context for the rest of the environmental impact, and specifically cumulative impact, analysis. The following three recommendations capture this contextual spirit. First, whether agencies ultimately choose a historic, existing conditions, or future baseline, they should first

174. *Id*. at 524.

175. The U.S. EPA appears to use past environmental reference points as a historical alternative to existing conditions, while CEQA has not yet addressed the issue of historical baseline. *See* EPA Guidance, *supra* note 106, at 15.

176. For example, if an agency stops doing an ongoing project or reduces an existing permit allowance, the impacted environment may actually improve; however, a standard existing conditions baseline may not reveal this because it assumes the continuation of all current projects in the impacted area.

177. *Neighbors for Smart Rail*, 304 P.3d at 524 (indicating that "[p]rojected future conditions may be used as the sole baseline for impacts analysis if their use in place of measured existing conditions . . . is *justified by unusual aspects* of the project or the surrounding conditions.").

consider historical trend data to contextualize their impact analysis. Historical trends provide critical information about natural variability over time.[178] If agencies can understand the natural variability of a system, they can better tease those inherent natural shifts like ocean temperature, habitat, or species abundance, from actual project and cumulative impacts;[179] however, an approach based on historical trends should never be used to *minimize* a project's impact. Using historical trend data to inform analyses does not mean that an agency must select a historical baseline. CEQA case law clarifies that the appropriate baseline in most situations is an existing conditions baseline, but it also encourages the use of historical trend data on past conditions to inform the measurement of current conditions.[180] This flexibility provides agencies the opportunity to use relevant historical context even when working with a baseline of existing conditions.[181]

Second, agencies should use ecological function to guide their selection of the appropriate baseline. Selecting an ecologically grounded baseline that references some basic ecological function of the impacted ecosystem could allow agencies to assess the resilience of the system in the project area. For example, seagrass is a foundation species that provides a variety of ecological functions,

178. *See* discussion *supra* Section IV.B; Jeremy B. C. Jackson et al., *Historical Overfishing and the Recent Collapse of Coastal Ecosystems*, 293 SCI. 629, 635 (2001).

179. For example, the Pacific Decadal Oscillation (PDO) influences ocean temperatures and triggers shifts in sardine and anchovy presence in the Pacific Ocean, with sardine abundance during warm ocean periods, and anchovy abundance during cool periods. *See generally* Francisco P. Chavez et al., *From Anchovies to Sardines and Back: Multidecadal Change in the Pacific Ocean*, 299 SCI. 217 (2003). Here, PDO phases could inform agency decisions. For example, if the PDO is in a warm phase where anchovies are rare, agencies should rely on this information to reduce fishing quotas during that time.

180. *See supra* Section IV.B.

181. Using historical trend data can also help to reveal whether a system could recover if there was no further development. If agencies view the "no action" alternative or existing conditions baseline as a continuation of the status quo rather than how the environment would react if the activities in the area ceased, we would get a more accurate picture of how cumulative impacts are affecting the environment. *See* discussion *supra* Section IV.B.2. This is particularly the case in dynamic ocean environments. For example, if there is a temporary moratorium on trawling for fish in a severely overfished area, the ecosystem may begin to recover. *See, e.g.*, BEN ENTICKNAP, ALASKA MARINE CONSERVATION COUNCIL, TRAWLING THE NORTH PACIFIC: UNDERSTANDING THE EFFECTS OF BOTTOM TRAWL FISHERIES ON ALASKA'S LIVING SEAFLOOR (2002). If, five years later, the ban is lifted and an agency uses the existing conditions as their baseline without analyzing historical trends, they will only note the degradation compared to surrounding areas and may surmise that the trawling will not cause any additional significant environmental effects. However, if they look at historical trends, they will see that while the system is still degraded, it is in recovery and any new activity may jeopardize that recovery. *Id*.

including habitat for a large number of fish species.[182] If a proposed project area has seagrass, agencies could include the current (or in some instances past) levels of ecological function resulting from the seagrass presence (e.g., habitat, nourishment, shelter, filtration, etc.) as a part of the environmental baseline against which they will measure the added impacts (individual or cumulative) of the proposed project.

Third, wherever possible, agencies should identify baselines with respect to relevant ecological thresholds and reference points within the project's geographic boundaries based on both their understanding of historical trends and knowledge of ecosystem function. Ecological thresholds, or tipping points, occur when "small shifts in human pressures or environmental conditions bring about large, sometimes abrupt, changes in a system."[183] Often drastic and abrupt, tipping points are also sometimes impossible or extremely challenging (in other words cost-prohibitive or ecologically difficult) to reverse. Because avoiding such tipping points can be both environmentally and politically advantageous, agencies should consider selecting project baselines with reference to known ecological tipping points. If done, agencies would then be able to select determinations of significance for project impact levels that include appropriate buffers to avoid impending tipping points, rather than on the basis of shifting baselines. Agencies do have discretion to use such ecological reference points under NEPA or to incorporate historical trend data into an existing condition under CEQA; however, challenges to agency implementation of these options include potential lack of historical trends or tipping points data. Selecting a past baseline may also see potential resistance from project applicants due to perceived penalties for impacts from past activities that were outside the applicants' control.

C. *Analysis of Past Impacts*

A second temporal component of cumulative impacts analysis is

182. *See generally* Emma L. Jackson et al., *The Importance of Seagrass Beds as a Habitat for Fishery Species*, 39 OCEANOGRAPHY & MARINE BIOLOGY 269 (2001).

183. OCEAN TIPPING POINTS, http://tinyurl.com/jvthgzg (last visited Jan. 31, 2014). The anchovy-sardine shift described in the earlier footnote is an example of a tipping point resulting from changed environmental conditions. Other tipping points may be caused by human impacts, such as the agricultural practices described earlier in this article that may input excessive nutrients into a nearshore estuary causing it to shift from a slow growing seagrass to a fast growing algae. *See, e.g.*, Carlos M. Duarte, *Submerged Aquatic Vegetation in Relation to Different Nutrient Regimes*, 41 OPHELIA 87 (1995).

the issue of examining past impacts, an element of the impact analysis that agencies often conflate with the determination of baseline. This conflation should not come as a surprise to legal scholars, the courts, or project proponents, since the most common baseline selection is that of "existing conditions," which by definition includes past project impacts. In many cases, analyzing past impacts will uncover historical trends in the way that an ecosystem or species population reacts to impacts. Data used to establish the baseline, however, does not account for these historical trends, and therefore may miss important indicators of ecosystem or species behavior. The inclusion of past impacts is important in two respects: first, to assess the continuing, and possibly interactive, impact of past activities, and, second, to predict the reasonably foreseeable impacts of a proposed project in light of past ecosystem reactions.[184] Therefore, including an analysis of past impacts into cumulative impacts assessments—as a separate step from determining baseline—is critical to accurately address multiple stressors on an ecosystem.

The following subsections identify court precedent recognizing the importance of assessing past impacts, as well as guidance recommending how to improve cumulative impacts analysis. We also address the required format for analyses of past impacts and how that can be improved, both under NEPA and CEQA.

1. *NEPA requirements for analyzing past impacts*

NEPA regulations define a cumulative impact as "the impact on the environment which results from the incremental impact of the [proposed] action when added to other *past,* present, and reasonably foreseeable future actions."[185] In *Kentucky Riverkeeper, Inc.,* the Sixth Circuit Court of Appeals relied on the Council on Environmental Quality's memorandum titled "Guidance on the Consideration of Past Actions in Cumulative Effects Analysis."[186] The guidance identifies two reasons for the *past* impact requirement: first, past impacts may be "relevant and useful in analyzing whether the reasonably foreseeable effects of the agency proposal for action

184. Kentucky Riverkeeper, Inc. v. Rowlette, 714 F.3d 402, 409-10 (6th Cir. 2013).

185. 40 C.F.R. § 1508.7 (2014) (emphasis added); *see Kentucky Riverkeeper*, 714 F.3d at 409. The Sixth Circuit relied on the Council on Environmental Quality's 2005 guidance document on the analysis of past impacts under NEPA, which states that "review of past actions is required to the extent that this review informs agency decisionmaking regarding the proposed action." *Id.* at 409.

186. *Id*. at 408.

and its alternatives may have a continuing, additive and significant relationship to those effects,"[187] and, second, "experience with and information about past direct and indirect effects of individual past actions may also be useful in . . . predicting the direct and indirect effects of a proposed action."[188] Illustrating the first reason, in *Oregon Natural Resources Council Fund v. Brong,* the Ninth Circuit struck down a Bureau of Land Management (BLM) logging proposal because significant cumulative impacts had already affected a portion of the proposed project area, and BLM's FEIS did not examine how the proposed project would exacerbate this "pre-existing deteriorated state."[189] This case indicated that courts will strike down agency assessments that do not analyze past impacts as a part of their cumulative impacts analysis. Consistent with the second reason, the U.S. Bureau of Reclamation (BOR) properly assessed past impacts to predict future ones in *Center for Environmental Law and Policy v. United States Bureau of Reclamation*.[190] In this case, the BOR reviewed a water diversion proposal in the Columbia River Basin, where the EA discussed an extensive history of landslides and recognized the potential for a correlation between low water levels in the Columbia River and landslides.[191] The Ninth Circuit determined that BOR's EA satisfied NEPA's past actions requirement for cumulative impacts analysis.[192]

The format for analysis of past impacts has evolved in recent years. For EISs developed prior to 2005, courts generally held that the cumulative impacts analysis was inadequate if it did not provide adequate data of the time, type, place, and scale of individual past activities.[193] In 2005, the Council on Environmental Quality drafted a memorandum to all federal agency heads to provide "Guidance on the Consideration of Past Actions in Cumulative Effects Analysis," in which it clarified that "[w]ith respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is

187. *Id*. at 409 (quoting Connaughton Memorandum, *supra* note 87, at 1).

188. *Id*. at 410 (quoting Connaughton Memorandum, *supra* note 87, at 2).

189. Or. Natural Res. Council Fund v. Brong, 492 F.3d 1120, 1134 (9th Cir. 2007).

190. Ctr. for Envtl. L. & Pol'y v. U.S. Bureau of Reclamation, 655 F.3d 1000 (9th Cir. 2011).

191. *Id*. at 1008.

192. *Id*. at 1008-09.

193. *See* Or. Natural Res. Council Fund v. Brong, 492 F.3d at 1133; Lands Council v. Powell, 395 F.3d 1019, 1028 (9th Cir. 2005).

useful and relevant to the required analysis of cumulative effects."[194] Since that time, federal courts have affirmed that this guidance document is entitled to deference because it is the Council on Environmental Quality's interpretation of its own regulations.[195] However, neither the memorandum nor any of the subsequent case law require agencies to aggregate past impacts. These precedents merely stand for the proposition that an agency is entitled to deference in its decision regarding whether to list individual past projects or to aggregate them.[196] For reasons that will be further discussed in the recommendations section, this provides a substantial opportunity for agencies to improve impact assessments to better align with scientific knowledge and principles.

2. *CEQA requirements for analyzing past impacts*

As with NEPA, CEQA requires agencies to adequately analyze past impacts in order to determine the cumulative effects of a proposed project.[197] The California Supreme Court has explained that "an EIS/EIR must reasonably include information about past projects *to the extent* such information is relevant to the understanding of the environmental impacts of the present project considered cumulatively with other pending and possible future projects."[198] In *Environmental Protection Information Center*, the California Supreme Court noted that

> [t]he following elements are necessary to an adequate discussion of significant cumulative impacts: (1) Either: (A) A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency, or (B) A summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been

194. Connaughton Memorandum, *supra* note 87, at 3.

195. League of Wilderness Defenders—Blue Mountains Biodiversity Project v. U.S. Forest Serv., 549 F.3d 1211, 1218 (9th Cir. 2008). In *Auer v. Robbins,* 519 U.S. 452, 461 (1997), the Supreme Court established that an agency's interpretation of its own regulations is entitled to strong deference unless it is "plainly erroneous or inconsistent with the regulation." In *League of Wilderness Defenders*, the Ninth Circuit interpreted this holding in light of the Council on Environmental Quality's guidance on past impacts and held that its interpretation was not plainly erroneous or inconsistent. 549 F.3d at 1218.

196. *See League of Wilderness Defenders*, 549 F.3d at 1218.

197. CAL. CODE REGS. tit. 14, §§ 15130(b)(1)(A)-(B), 15355(b).

198. City of Long Beach v. L.A. Unified Sch. Dist., 98 Cal. Rptr. 3d 137, 157 (Cal. Ct. App. 2009) (citing Envtl. Prot. Info. Ctr. v. Cal. Dep't of Forestry and Fire Prot., 187 P.3d 888, 932 (Cal. 2008)).

> adopted or certified, which described or evaluated regional or areawide conditions contributing to the cumulative impact.[199]

In determining whether an agency should have included a past impact in its environmental assessment, California courts will determine whether inclusion "was reasonable and practical . . . and whether, without [its] inclusion, the severity and significance of the cumulative impacts were reflected adequately."[200]

3. *Recommendations going forward*

Agencies should use their discretion to assess *both* continuing impacts from past projects and past project impacts that have changed the system as examples of how future projects may impact the system. Notably, while CEQA has not distinguished between these two goals for analyzing past impacts, this distinction is relevant to California agencies and separating the two as important is one way that practitioners in the State can improve their analyses.

Although both NEPA and CEQA guidance recognize agency discretion to aggregate past impacts,[201] it is possible that only listing individual past projects would limit the qualitative and quantitative information necessary to determine ecosystem impacts. Knowing that eighty percent of a forest has been cleared does not provide as much contextual information as knowing that thirty percent was cleared twenty years ago and fifty percent was cleared five years ago. More detailed information about past clearing events may enable an agency to determine the amount of forest that is in different stages of recovery and how much additional logging it may be able to withstand before ecosystem failure takes place. However, we recognize that making critical scientific assessments and decisions is difficult for agencies without qualitative data such as the spatial and temporal relationship between logging events. In that event, the absence of data should be included in the assessment and should warrant a more precautionary approach[202] in evaluating

199. *Envtl. Prot. Info. Ctr.*, 187 P.3d at 931.

200. *City of Long Beach*, 98 Cal. Rptr. 3d at 153 (citing *Envtl. Prot. Info. Ctr.*, 187 P.3d at 932).

201. *See* supra Section IV.C.

202. The precautionary approach states "[w]here there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." United Nations Conference on Environment and Development, Rio de Janeiro, Braz., June 3-14, 1992, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/26 (Vol. I), Principle 15

possible cumulative impacts. This example shows that it is possible for agencies to significantly improve their cumulative impacts analyses by taking a contextual approach to past impacts.

In addition to providing critical context, listing past project impacts relevant to the proposed project's cumulative effects analysis can limit conflation of relevant past impacts with determination of baseline.

Finally, agencies can find past projects and their impacts that are relevant to cumulative impacts assessments by consulting with sister agencies whose past information and decision documents regarding their own decisions in the proximity of the project at issue may provide valuable quantitative and qualitative data. For additional discussion, see the recommendations *infra* in the discussion of "Like Projects" v. "Like Impacts" at Section IV.A.

D. *Inclusion of Future Projects and Future Impacts*

Both NEPA and CEQA require cumulative impacts analyses to consider and incorporate foreseeable future impacts and projects.[203] However, there is a potential for agencies to inappropriately fold future impacts into the existing conditions baseline, arguing that because the future projects are "presently foreseeable," they are part of existing conditions.[204] The following subsections explain criteria for determining when to assess a not-yet-in-existence future project.[205]

1. *Reasonably foreseeable future projects under NEPA*

The Council on Environmental Quality's guidance document "Considering Cumulative Effects Under the National Environmental Policy Act" clarifies the temporal scope for considering future actions. The guidance states that agencies should determine how

(Aug. 12 1992).

203. 40 C.F.R. § 1508.7 (2014); CAL. CODE REGS. tit. 14, §§ 15064(h)(1), 15130(b)(1) (2014).

204. *See infra* Section IV.D. Including future projects within the baseline may alter the threshold for determining the significance of additional impacts. Also, if agencies bypass the NEPA and CEQA requirements and fail to address reasonably foreseeable future impacts in their analyses of cumulative impacts, it is possible that both the proposed project and the future project will escape true assessment of their respective cumulative effects.

205. While it can be more straightforward to analyze future impacts of past and existing projects that are already in place, determining when a newly proposed project is definite enough that it should be considered in a future impact analysis can be challenging for agencies. It is indisputable that many development ideas never reach fruition, or, if they do, plans are developed in a form that is different than the project originally conceived.

long the proposed project's impacts are expected to have effects and identify other actions occurring during that timeframe.[206] It also emphasizes that the length of time a project's impacts are expected to have effects varies from impact to impact.[207] For instance, building and operating a port may impact the coastal marine ecosystem in a number of different ways, including habitat loss during construction and air emissions during port operations from daily shipping activity.[208] The impacts associated with construction may be finite whereas the impacts associated with operation of the port may be ongoing.[209] Moreover, the air emissions associated with operation of the port may impact air quality in both the short and long term and water quality in the long term.[210] Because of such durational discrepancies, an agency should identify the time span of each proposed project's predicted impacts and then find reasonably foreseeable future project impacts within each time frame.[211] In this example, an agency following the Council on Environmental Quality's guidance would include future impacts foreseeable through the time frame of port operations, rather than just during construction of the port.

Once an agency has defined a time frame for each effect, the second step is to determine whether a future project within that time period is "reasonably foreseeable."[212] Generally, this determination depends on how definite the future project is and

206. CEQ Cumulative Effects Guidance, *supra* note 17, at 16.

207. *Id*. at 16, 19.

208. *See* Diane Bailey & Gina Solomon, *Pollution Prevention at Ports: Clearing the Air*, 24 ENVTL. IMPACT ASSESSMENT REV. 749, 749-52 (2004) (describing the air quality impacts from port operations), *available at* http://tinyurl.com/mbfkqxk. *See also* Michael R. Johnson et al., *Impacts to Marine Fisheries Habitat from Nonfishing Activities in the Northeastern United States*, NOAA Technical Memorandum NMFS-NE-209, ch. 5, 123-26 (2008) (describing the ways in which port construction negatively impacts coastal and marine habitats), *available at* http://tinyurl.com/momhknz.

209. *See* Johnson et al., *supra* note 208, at 123-26.

210. *See* Bailey & Solomon, *supra* note 208, at 749-55. Air emissions may also adversely affect water quality within the coastal marine ecosystem. *See* Ryan P. Kelly & Margaret R. Caldwell, *Ten Ways States Can Combat Ocean Acidification (And Why They Should),* 37 HARV. ENVTL L. REV. 57, 58, 83-85 (2013). *See generally* Ryan P. Kelly et al., *Mitigating Local Causes of Ocean Acidification with Existing Laws*, 332 SCI. 1036 (2011).

211. CEQ Cumulative Effects Guidance, *supra* note 17, at 16. The Guidance further clarifies that even though the direct, project-specific effects of a proposed action may drop off over time to the point where they are insignificant, these project-specific effects "may combine with the effects of other actions beyond the time frame of the proposed action and result in significant cumulative effects that must be considered." *Id*.

212. 40 C.F.R. § 1508.7 (2014).

how many details are available regarding its potential impacts.[213] There is no hard-line rule with respect to when projects are reasonably foreseeable. Instead, agencies apply a facts-based analysis.[214] Moreover, the circuit courts' interpretations of when a project is reasonably foreseeable are inconsistent, as the following paragraphs show.

When considering future projects, courts recognize that "[i]t is not appropriate to defer consideration of cumulative impacts to a future date when meaningful consideration can be given now,"[215] although NEPA does not require "the government to do the impractical, if not enough information is available to permit meaningful consideration."[216] Instead, reasonably foreseeable projects fall somewhere in the middle.[217] The Fifth Circuit has defined reasonably foreseeable as "sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision."[218] Projects "need not be finalized before they are reasonably foreseeable."[219] Ultimately, the primary consideration is whether a future project is "speculative."[220]

Generally, the determination of whether a future project is speculative will depend on how much information is available regarding the future project when an agency completes a draft EIS for a project.[221] In *Habitat Education Center v. U.S. Forest Service*, the Seventh Circuit held that an agency may exclude from a final EIS "those projects that cannot be meaningfully discussed at the time the agency issues its draft EIS and [that] do not significantly alter the environmental landscape as presented in that draft."[222] The court's reasoning was that the NEPA regulatory scheme "front-loads

213. *See* CEQ Cumulative Effects Guidance, *supra* note 17, at 19.

214. *See id*.

215. N. Plains Res. Council v. Surface Transp. Bd., 668 F.3d 1067, 1078 (9th Cir. 2011) (quoting Envtl. Prot. Info. Ctr. v. U.S. Forest Serv., 451 F.3d 1005, 1014 (9th Cir. 2006)).

216. *Id*.

217. The CEQ Cumulative Effects Guidance points out that although looking only at actions which are funded or have NEPA approval likely underestimates the number of future projects, looking at all proposals in the planning or budgeting phase likely overestimates the future cumulative effects. CEQ Cumulative Effects Guidance, *supra* note 17, at 19.

218. La. Crawfish Producers Ass'n-W. v. Rowan, 463 F.3d 352, 358 (5th Cir. 2006) (quoting City of Shoreacres v. Waterworth, 420 F.3d 440, 453 (5th Cir. 2005)).

219. *N. Plains Res. Council,* 668 F.3d at 1078.

220. *See* EPA Guidance, *supra* note 106, at 13.

221. Habitat Educ. Ctr. v. U.S. Forest Serv., 673 F.3d 518, 522 (7th Cir. 2012) (finding that an agency need not consider in its final EIS a future project that was not formally proposed until after the draft EIS had been issued).

222. *Id*. at 527.

the EIS's analytic processes and contemplates publication of a final EIS that addresses issues raised about the draft."[223] The court also recognized "the need to avoid interpreting NEPA in a way that would 'paralyze agencies by preventing them from acting until inchoate future projects take shape (by which time, presumably, new inchoate projects would loom on the horizon).'"[224]

The Ninth Circuit has held that proposed actions are reasonably foreseeable and may be meaningfully discussed when an agency issues a notice of intent to prepare an EIS for a future project.[225] For instance, in *Center for Environmental Law and Policy v. U.S. Bureau of Reclamation*, the court held that because an agency had issued a notice of intent to prepare an EIS, the project was a reasonably foreseeable future project.[226] However, in both *Center for Environmental Law and Policy* and *Northern Alaska Environmental Center v. Kempthorne*, the Ninth Circuit held that an agency may postpone its analysis of the cumulative impacts of a reasonably foreseeable proposed action if the agency agrees to conduct a cumulative impacts analysis before acting on the project.[227]

Notably, the circuits diverge in their opinions regarding whether a notice of intent to prepare an EIS makes a project reasonably foreseeable. Unlike the Ninth Circuit, the Fifth Circuit does not agree that a proposed project is necessarily reasonably foreseeable before it has reached the draft EIS stage.[228] However, it did not create a

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223. *Id*.

224. *Id*. at 526 (quoting Habitat Educ. Ctr. v. U.S. Forest Serv., 609 F.3d 897, 903 (7th Cir. 2010)).

225. Ctr. for Envtl. L. & Policy v. U.S. Bureau of Reclamation, 655 F.3d 1000, 1010 (9th Cir. 2011).

226. *Id*. at 1010-11.

227. *Id*. (holding that the agency's EA was *not* inadequate for failing to consider the reasonably foreseeable future project because the agency had already issued a notice of intent that it was going to prepare an EIS for the project at hand—thereby impliedly promising to consider the cumulative effects of the future project in that EIS); N. Alaska Envtl. Ctr. v. Kempthorne, 457 F.3d 969, 980 (9th Cir. 2006) (finding that the agency did not violate NEPA, even where it failed to consider a reasonably foreseeable future project in its EIS, because the agency was going to assess the cumulative impacts of that future project when it analyzed future site-specific drilling permits). The agency in *Northern Alaska Environmental Center* argued that the future project impacts should be considered when evaluating site-specific drilling permits rather than in the EIS because only when the drilling locations are known can the environmental consequences be properly addressed. 457 F.3d at 973.

228. *See* Gulf Restoration Network v. U.S. Dep't of Transp., 452 F.3d 362, 369, 371 (5th Cir. 2006) (finding that, due to the many steps required after filing an application for a port by the Deepwater Port Act, "until a draft EIS is available, there is insufficient certainty about the project's future construction and environmental consequences to include it in the

blanket rule that proposed projects are not reasonably foreseeable until they reach the draft EIS stage.[229]

Turning to a different category of future projects, in *Northern Plains Resource Council, Inc. v. The Surface Transportation Board*, the Ninth Circuit addressed the issue of future projects proposed in a programmatic EIS.[230] It found that where an earlier programmatic EIS outlined the likely scope of future development in detail, the future development is considered "reasonably foreseeable" and the agency must incorporate it into the impact analysis.[231] In contrast, the Third Circuit has held that future development mentioned in planning documents is not sufficiently concrete where there is no evidence that the future plans will be realized.[232]

2. *Probable future projects under CEQA*

As with NEPA, CEQA regulations require state agencies to consider "past, present, and *probable future projects* producing related or cumulative impacts."[233] The regulations also state that "'[c]umulatively considerable' means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of *probable future projects.*"[234] Notably, although the terminology in the statutes differs—NEPA refers to "reasonably foreseeable future projects," whereas CEQA refers to "probable future projects"—their standards for incorporating future impacts into analyses are similar.

Under CEQA, an agency must consider potential future projects at the "earliest possible stage, even though more detailed environmental review may be necessary later."[235] California courts

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cumulative impact calculus" and that the Secretary of Transportation's decision to draw the line at projects for which draft EISs were available was within his discretion under NEPA). The D.C. Circuit Court of Appeals has similarly held that for cumulative impacts purposes, a notice of intent to prepare an EIS did "not establish reasonable foreseeability of the incremental impact of those projects in connection with [the project at hand]." Theodore Roosevelt Conservation P'ship v. Salazar, 616 F.3d 497, 513 (D.C. Cir. 2010).

229. *See Gulf Restoration Network*, 452 F.3d at 369-71.

230. N. Plains Res. Council v. Surface Transp. Bd., 668 F.3d 1067, 1078 (9th Cir. 2011).

231. *Id*. at 1079.

232. Soc'y Hills Towers Owners' Ass'n v. Rendell, 210 F.3d 168, 182 (3rd Cir. 2000) ("NEPA only requires consideration of the cumulative impact of proposed, and not merely contemplated future actions. Where future development is unlikely or difficult to anticipate there is no need to study cumulative impacts.").

233. CAL. CODE REGS. tit. 14, § 15130(b)(1)(A) (2014) (emphasis added).

234. *Id*. § 15064(h)(1) (emphasis added).

235. Envtl. Prot. Info. Ctr. v. Cal. Dep't of Forestry & Fire Prot., 187 P.3d 888, 917 (Cal.

recognize that "[w]here future development is unspecified and uncertain, no purpose can be served by requiring an EIR to engage in sheer speculation as to future environmental consequences."[236] Instead, a project only qualifies as a "probable future project" to the extent that the proposed project "is both probable and sufficiently certain to allow for meaningful cumulative impacts analysis."[237] As under NEPA, the issue of whether a future proposed project qualifies as probable is factually dependent.

In *Friends of the Eel River v. Sonoma County Water Agency*, the California Court of Appeal considered an EIR prepared by the Sonoma County Water Agency (Water Agency) for a proposal to withdraw more water from the Russian River.[238] Simultaneously, there were proposals before the Federal Energy Regulatory Commission (FERC) that would effectively decrease the water available to the Water Agency.[239] The Water Agency's EIR did not mention these proposals.[240] The California Court of Appeal concluded that it was both "reasonable and practical" to include the FERC proposals in the cumulative impacts analysis, where the FERC proposals were under environmental review because an EIS had been initiated.[241]

One criterion under CEQA for determining whether a future project is probable is whether "the applicant has devoted significant time and financial resources to prepare for any regulatory review."[242] The California Court of Appeal assessed the question of whether projects under environmental review qualify as probable future projects in *San Franciscans for Reasonable Growth v. City of San Francisco*.[243] The court found that

> experience and common sense indicate that projects which are under review are 'reasonabl[y] foreseeable probable future

2008) (quoting Rio Vista Farm Bureau Ctr. v. Cnty. of Solano, 7 Cal. Rptr. 2d 307, 314 (Cal. Ct. App. 1992)).

236. *Id*. at 917 (quoting *Rio Vista Farm Bureau Ctr*., 7 Cal. Rptr. 2d at 315).

237. City of Maywood v. L.A. Unified Sch. Dist., 145 Cal. Rptr. 3d 567, 598 (Cal. Ct. App. 2012).

238. 134 Cal. Rptr. 2d 322, 327 (Cal. Ct. App. 2003).

239. *Id*. at 331.

240. *Id*. at 330.

241. *Id*. at 332.

242. Gray v. Cnty. of Madera, 85 Cal. Rptr. 3d 50, 74 (Cal. Ct. App. 2008).

243. San Franciscans for Reasonable Growth v. City of San Francisco, 198 Cal. Rptr. 634 (Cal. Ct. App. 1984).

> projects.' A significant investment of time, money and technical planning in the construction of a high-rise office building have necessarily occurred before a project is even submitted . . . for initial review. . . . Having made such a substantial commitment to the pre-construction phase of a high-rise project, what developer, whose project is being reviewed, would argue most strenuously that his project is *not* a reasonably foreseeable project?[244]

In contrast, however, the court held in *City of Maywood v. Los Angeles Unified School District* that a project for which a notice of preparation had been issued was not probable.[245] The case concerned a proposal to build a high school in the Los Angeles Unified School District.[246] The City of Maywood challenged the EIR for the high school on the grounds that it did not consider the cumulative impacts of a potential highway off-ramp near the school that would increase traffic around the school.[247] Maywood further asserted that the off-ramp was "probable" because Caltrans had issued a notice of preparation for an I-710 corridor project and was in the scoping phase of the project.[248] However, the only evidence the City provided that the off-ramp was a potential element of the Corridor project was a single statement by the agency that it was considering the off-ramp.[249] On appeal, the court held that this evidence was not enough to indicate that the off-ramp was a probable component of the Corridor project.[250] In addition, the court noted that the City had not provided any evidence that it would be reasonable and practical to analyze the effects of the off-ramp.[251]

Although *San Franciscans for Reasonable Growth* and *Maywood* are seemingly at odds, one critical distinguishing factor is that the issue in *Maywood* was whether a specific component of a future project—the off-ramp—was probable, not the corridor project generally. Accordingly, even though the corridor project was under review, the court was not able to find fault with the agency's determination that the specific component was speculative. Otherwise, *Maywood* does not alter the holding in *San Franciscans*

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244. *Id*. at 641.

245. City of Maywood v. L.A. Unified Sch. Dist., 145 Cal. Rptr. 3d 567, 598 (Cal. Ct. App. 2012).

246. *Id*. at 575.

247. *Id*. at 595.

248. *Id*. at 597.

249. *Id*.

250. *Id*. at 599.

251. *Id*.

for Reasonable Growth that projects under review should generally be considered probable.

3. *Recommendations going forward*

In order to include future projects and future impacts in cumulative impacts assessments, agencies must first establish the relevant time period during which each of the project's impacts will have an effect. Next, agencies should identify future projects with relevant impacts that will occur within that same timeframe.[252] Finally, agencies can find future projects and their impacts by consulting with sister agencies, referencing planning documents, and identifying notices of intent to develop EISs and EIRs. For additional discussion of these suggestions, see the recommendations *infra* in the discussion of "Like Projects" v. "Like Impacts" at Section IV.A.

E. *Selection of Geographic Boundaries*

Selecting a proper baseline and incorporating past, ongoing, and future impacts are not the only critical steps in conducting an effective cumulative impacts assessment—defining appropriate geographic boundaries is important for considering relevant impacts in an assessment. If the scale of analysis is too constrained, the full cumulative impact of a project may not be accounted for. If the scale of analysis is too broad, however, it may create an impossible task for agencies to identify an infinite number of potential impacts and agencies may underestimate the impacts of a proposed project.

1. *Geographic boundaries under NEPA*

The NEPA regulations state that an EIS must "succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration," but do not directly address the geographic scale of a cumulative impacts assessment.[253] Council on Environmental Quality guidance and case law indicate two general

252. For example, if a project will have water quality impacts on a watershed over the next five years, the responsible agency should assess the cumulative impacts of other projects that are likely to occur within that timeframe that will also impact the watershed. Wherever there is uncertainty as to the timeframe of expected project impacts, agencies should apply a precautionary approach by being over-inclusive in impact assessments.

253. Council on Environmental Quality, 40 C.F.R. § 1502.15 (2014).

principles for selecting geographic boundaries that federal agencies must meet when complying with NEPA. First, geographic boundaries should be based on the resource or system. Second, courts defer to agencies so long as agencies provide support for their geographic boundary selection.

The guidance provides that the appropriate boundary for a cumulative impacts assessment depends on the resource or system involved and that assessments "should be conducted on the scale of human communities, landscapes, watersheds, or airsheds."[254] The guidance recommends that for every proposed action or reasonable alternative agencies should:

> - Determine the area that will be affected by that action. That area is the project impact zone.
> - Make a list of the resources within that zone that could be affected by the proposed action.
> - Determine the geographic areas occupied by those resources outside of the project impact zone. In most cases, the largest of these areas will be the appropriate area for the analysis of cumulative effects.
> - Determine the affected institutional jurisdictions, both for the proposing agency and other agencies or groups.[255]

The geographic scale of analysis appropriate for migratory wildlife, such as humpback whales, may differ significantly from that of non-migratory, or resident, wildlife species, like abalone, based on the distance a species might travel. An agency considering impacts to resident wildlife might need to look only at the species' habitat or ecosystem, while analysis of impacts to migratory wildlife should consider migration paths, breeding grounds, and seasonal ranges.[256] For example, in *Natural Resources Defense Council, Inc. v. Hodel*, the D.C. Circuit held that the Department of the Interior failed to adequately perform cumulative impacts analysis for the outer continental shelf leasing program because it did not consider the effect of simultaneous *inter-regional* development on transboundary species such as migratory whales charted in planning areas in the Pacific and Alaskan regions.[257] Instead, the agency considered impacts such as fishing, coastal development, and shipping *within*

254. CEQ Cumulative Effects Guidance, *supra* note 17, at 12.
255. *Id*. at 15.
256. *Id*.
257. Natural Res. Def. Council v. Hodel, 865 F.2d 288, 297 (D.C. Cir. 1988).

the area.[258] While the agency assessed impacts from various types of projects within the area, the area did not adequately account for the migratory path of marine mammals and the agency failed to consider other concurrent inter-regional oil development planning areas along that relevant migratory path.[259]

Case law also indicates that agencies must provide support for their approval of geographic boundary selections. In *Selkirk v. Forsgren*, the Ninth Circuit Court of Appeals considered whether the geographic boundaries the United States Forest Service (USFS) selected to analyze the cumulative effects of a road-building project by a lumber company in bear habitat was adequate despite the agency's decision not to include lands nearby.[260] The court found that "[t]he task of selecting the geographic boundaries of an EIS requires a complicated analysis of several factors, such as the scope of the project considered, the features of the land, and the types of species in the area."[261] The court upheld the USFS's approval of the proposed road-building project, finding that the USFS justified its geographic boundary decision when it concluded that the other lands would implicate a different watershed and topography.[262] Alternatively, in *Idaho Sporting Congress, Inc. v. Rittenhouse*, the Ninth Circuit Court of Appeals struck down the USFS's decision to use the smaller, home range scale of certain relevant species to define the geographic boundaries of the cumulative effects area.[263] The Court held the USFS arbitrarily chose to use the home range, particularly since the Forest Service's own Monitoring Plan stated that management at a larger landscape scale is necessary to protect the habitat needs of the affected species.[264]

2. *Geographic boundaries under CEQA*

CEQA case law articulates the same general principles for selecting geographic boundaries that federal agencies must meet when complying with NEPA. CEQA defines the environment as "the physical conditions which exist within the area which will be affected by a proposed project, including land, air, water, minerals,

258. *Id*. at 298.
259. *Id*. at 297.
260. Selkirk v. Forsgren, 336 F.3d 944, 951 (9th Cir. 2003).
261. *Id*. at 958.
262. *Id*. at 959-60.
263. Idaho Sporting Cong., Inc. v. Rittenhouse, 305 F.3d 957, 973-74 (9th Cir. 2002).
264. *Id*. at 974-75.

flora, fauna, noise, [or] objects of historic or aesthetic significance."[265] Accordingly, the project area is not always synonymous with the relevant environment if the project's effects extend beyond the project area.[266] Agencies should define the geographic scale according to the resource or system the project will impact.[267]

For example, in *City of Long Beach v. Los Angeles Unified School District*, the City of Long Beach (City) challenged the geographic scope of the cumulative impacts assessment for air quality in the Los Angeles Unified School District's (District) Final EIR for a plan to build a high school.[268] The District's Final EIR air quality chapter stated that the entire South Coast Air Basin served as the geographic scale for air quality impacts.[269] The chapter titled "Cumulative Scenario" summarized the geographic scope of the cumulative impacts analysis for all impacts as limited to approximately three miles surrounding the project site, an area much smaller than the South Coast Air Basin.[270] Despite the conflicting geographic scopes described in the two chapters, the "Cumulative Scenario" chapter also explained that the cumulative impacts for each topic area, including air quality, were discussed in the relevant topic area chapters.[271] The court found that the District's use of the South Coast Air Basin as the geographic scope for air pollution cumulative impacts was appropriate because analyzing different geographic boundaries for each resource or system impact fulfilled CEQA's requirements, even though the analysis was not in the cumulative impacts section.[272]

In another case, the appellate court found an agency's determination of geographic scale inadequate because it failed to consider the cumulative impacts from a closely related project to be constructed nearby. In *Bakersfield Citizens for Local Control v. City of Bakersfield*, a citizens group challenged the City's approval of two proposed retail shopping centers within 3.6 miles of each other, alleging that the geographic scale of the EIRs were inadequate because they each failed to address the other shopping center

265. CAL. PUB. RES. CODE § 21060.5 (2014).

266. City of L.A. v. Cnty. of Kern, 27 Cal. Rptr. 3d 28, 54 (Cal. Ct. App. 2005).

267. City of Long Beach v. L.A. Unified Sch. Dist., 98 Cal. Rptr. 3d 137, 154 (Cal. Ct. App. 2009) ("The area affected will depend on the nature of the impact being analyzed.").

268. *Id*.

269. *Id*. at 155.

270. *Id*. at 154.

271. *Id*.

272. *Id*. at 155.

project.[273] The court noted that because of their geographic proximity, the shopping centers would compete with each other, might cause adverse effects associated with big box retailers, would share four major roadways compounding traffic impacts, and would each adversely impact air quality.[274] The court articulated the rule that the area of analysis "cannot be so narrowly defined that it necessarily eliminates a portion of the affected environmental setting."[275]

California courts also agree that agency determinations of geographic scale are entitled to deference so long as there is substantial evidence in the record to support the agencies' determinations and the justifications are reasonable.[276] Unlike NEPA's regulations, the CEQA Guidelines address geographic scale of cumulative impacts analyses, directing lead agencies to "define the geographic scope of the area affected by the cumulative effect and provide a reasonable explanation for the geographic limitation used."[277] The "reasonable explanation" is essential for judicial deference to agency determinations. In *Bakersfield Citizens for Local Control*, the court stated that where no justification was offered, the "selection of 'appropriate' geographic areas that just happen[ed] to narrowly miss the other large proposed shopping center in every category of impacts despite their overlapping market areas and shared roadways [did] not constitute the good faith disclosure and analysis that is required by CEQA."[278] This case contrasts with *City of Long Beach* where the agency adequately justified its determination that the South Coast Air Basin was an appropriate choice for the geographic scope of its analysis.[279]

273. Bakersfield Citizens for Local Control v. City of Bakersfield, 22 Cal. Rptr. 3d 203, 210 (Cal. Ct. App. 2004).

274. *Id*. at 228.

275. *Id*. at 228-29.

276. *City of Long Beach*, 98 Cal. Rptr. 3d at 154 ("[S]election of the geographic area affected by the cumulative impacts falls within the lead agency's discretion."); Ebbetts Pass Forest Watch v. Dep't of Forestry & Fire Prot., 20 Cal. Rptr. 3d 808, 821 (Cal. Ct. App. 2005) ("The selection of the assessment area is left to the Department's expertise, and absent a showing of arbitrary action, we must assume the Department exercised its discretion appropriately.").

277. CAL. CODE REGS. tit. 14, § 15130(b)(3) (2014).

278. *Bakersfield Citizens for Local Control*, 22 Cal. Rptr. 3d at 229.

279. *City of Long Beach*, 98 Cal. Rptr. 3d at 154.

3. *Recommendations going forward*

The scale of analysis is essential to considering the relevant impacts in a cumulative impacts assessment. To identify the appropriate geographic scale for impacts analysis, agencies should use a three-step approach to consider the impacts on local, regional, and global geographic scales (Figure 3). This would ensure that agencies do not overlook local impacts by conducting too broad an analysis or ignore global-scale changes by focusing their analysis too narrowly.[280]

280. Consider, for example, that the scale required to address the cumulative impacts of shipping on gray whales, a migratory species traveling from Arctic waters to Mexico's Baja peninsula, might differ from the impacts of shipping on a pod of resident orcas. Regional scale analyses already occur in terrestrial systems. *See generally* DAVID BUNN ET AL., CAL. DEP'T OF FISH & GAME, CALIFORNIA WILDLIFE: CONSERVATION CHALLENGES (2007), *available at* http://tinyurl.com/mbeok4j. Agencies should consider adopting the tiered approach in the coastal and marine environment.

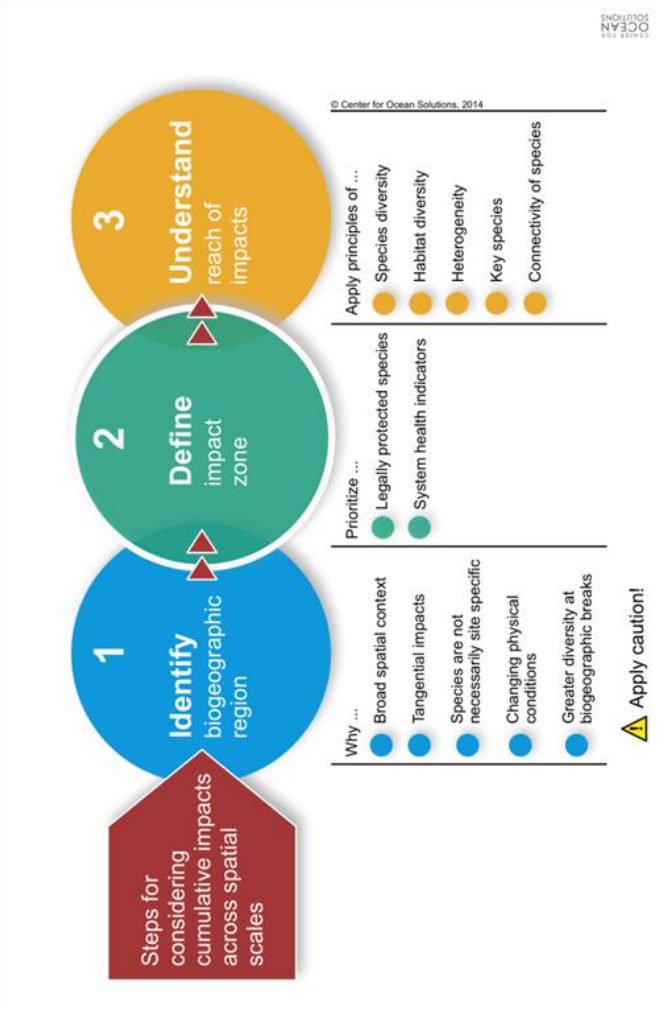

Figure 3. Recommended three-step approach for considering impacts on local, regional, and global geographic scales.

First, biogeographical regions (Figure 4)—naturally occurring zones or boundaries in the ocean, typically based on biophysical processes such as temperature, salinity, ocean currents, and species distributions[281]—can provide important context regarding the geography and resources potentially impacted by a project.

281. M.D. Spalding et al., *Marine Ecoregions of the World: A Bioregionalization of Coastal and Shelf Areas*, 57 BIOSCIENCE 573, 575 (2007), *available at* http://tinyurl.com/mtbckpr.

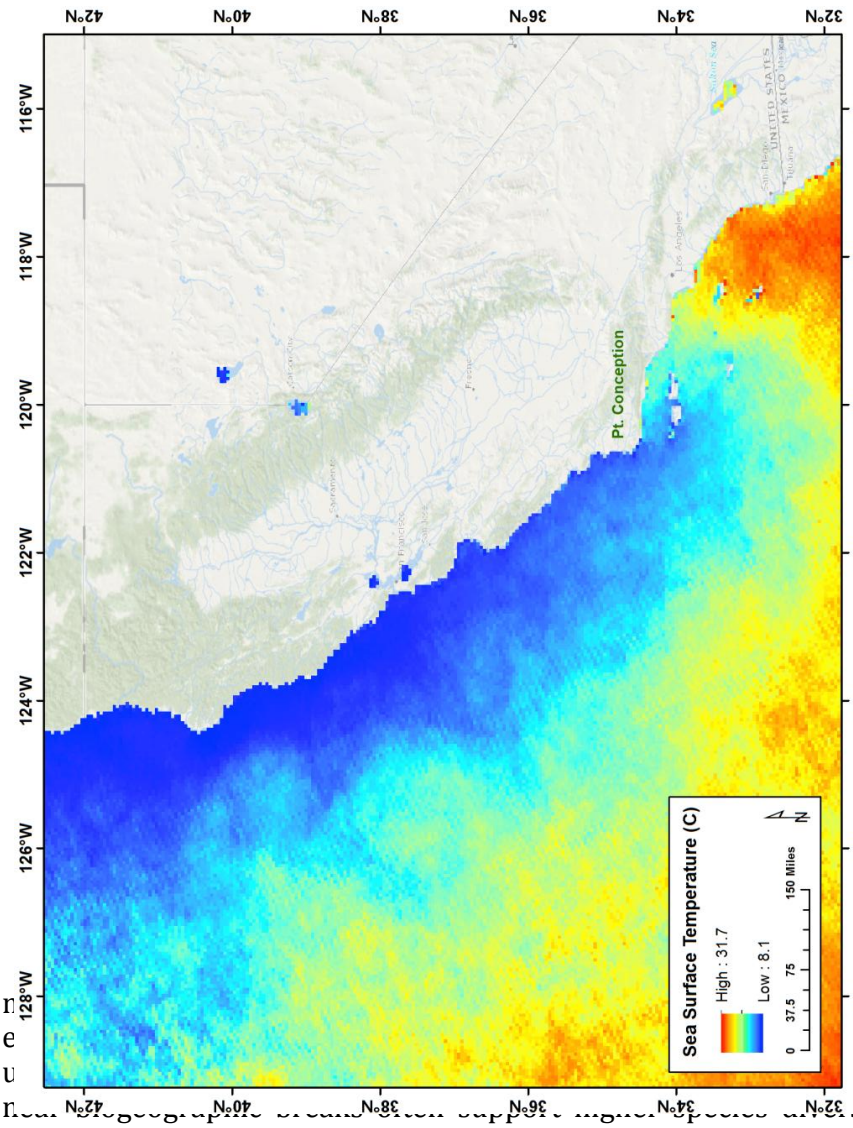

Figure 4. California Current Large Marine Ecosystem, Point Conception serves as a natural biogeographical break and an area of relatively high species diversity due to the confluence of warmer and colder waters.[282]

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near biogeographic breaks often support higher species diversity because two assemblages of species converge in that area.[283] Therefore, the direct, indirect, and cumulative effects from a proposed project at or near a biogeographic break should be more cautiously analyzed because the project may impact a broader range

282. *See* C.A. Hall, Jr., *Shallow-Water Marine Climates and Molluscan Provinces*, 45 ECOLOGY 226, 231 (1964), *available at* http://tinyurl.com/pbktleq; *see also* TARA A. C. WILKINSON ET AL., COMM'N FOR ENVTL. COOPERATION, MARINE ECOREGIONS OF NORTH AMERICA 108 (2009), *available at* http://tinyurl.com/kqmlzhm.

283. *See supra* Figure 4 and note 282.

of species and habitat types and recovery may be slower than other areas.[284]

Second, after setting the broad contextual stage, agencies must define the project impact zone.[285] Because identifying all possible species, habitats, or communities impacted by the project would be cost and time intensive, agencies could limit their scope to identifying priority species of interest that would be impacted by the project. Because it is impossible to map every species independently, agencies should first focus on legally protected species and system health indicators (i.e., species or habitats known to vary with ecosystem health), where identified. These might include designations such as threatened or endangered under the California Endangered Species Act, environmentally sensitive habitat areas under the California Coastal Act, Essential Fish Habitat or Habitats of Particular Concern under the Magnuson-Stevens Fishery Conservation and Management Act, or indicator species—such as top predators, foundation habitats, or forage fish—in marine systems.[286]

Third, agencies should apply key ecological principles describing species diversity, habitat diversity and heterogeneity, populations of key species, and connectivity of species,[287] to understand the potential reach of project impacts on these species and resources. For example, what is the footprint of seagrass present in the project area? After working through these steps agencies should be able to better determine an appropriate geographic scale depending on the species of interest and the ecological principles informing the need for a geographic boundary.

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284. Recovery following an environmental impact to these areas can be slow because natural recruitment to these areas is typically low due to oceanographic patterns. B. R. Broiman et al., *Spatial and Temporal Patterns of Invertebrate Recruitment Along the West Coast of the United States*, 78 ECOLOGICAL MONOGRAPHS 403, 413 (2008), *available at* http://tinyurl.com/p9wkond; L.L. Conway-Cranos, *Geographic Variation in Resilience: An Experimental Evaluation of Four Rocky Intertidal Assemblages*, 457 MARINE ECOLOGY PROGRESS SERIES 67, 80 (2012), *available at* http://tinyurl.com/ncdev5g.

285. *See supra* Section IV.E.

286. *See* Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1801 (2014); CAL. FISH & GAME CODE §§ 2070, 2856 (2014); CAL. PUB. RES. CODE § 30240 (2014).

287. For detailed discussions of the ecological principles and their utility for management and cumulative impacts analysis, *see* ASHLEY L. ERICKSON, MELISSA M. FOLEY, ERIN E. PRAHLER & MARGARET R. CALDWELL, CTR. FOR OCEAN SOLUTIONS, INCORPORATING ECOLOGICAL PRINCIPLES INTO CALIFORNIA OCEAN AND COASTAL MANAGEMENT: EXAMPLES FROM PRACTICE 137-38 (2012). *See generally* Melissa M. Foley et al., *Guiding Ecological Principles for Marine Spatial Planning*, 35 MARINE POL'Y 955 (2010), *available at* http://tinyurl.com/ne6mt3h.

V. CONCLUSION

Identifying, measuring, and managing cumulative impacts in complex and dynamic ocean ecosystems continue to be a significant challenge for state and federal agencies. But given the severe, and sometimes irreversible, consequences cumulative impacts can have on our valuable marine ecosystems, it is a challenge worth tackling from a scientific, legal, and practitioner standpoint now, and with gusto. Ocean-based activities that can impact marine ecosystems are many, including shipping, fishing, recreational sports, and transportation. These activities, combined with land-based activities like coastal power generation, agriculture, and dredging, lead to impact levels that coastal and ocean ecosystems often cannot withstand. As daily pressures mount, a variety of valuable marine ecosystem services—including water filtration, habitat, shelter, and nutrition—begin to fail. Frequently, the total impact of activities on our ocean ecosystems is greater than each activity's impact in isolation due to additive and interactive effects, and the combination of activities has the potential to cause severe environmental degradation.

Moreover, increasing local, regional, national, and international ecological and anthropogenic stressors are pushing some marine systems up to, or in some cases past, their breaking points. When combinations of stressors push systems beyond these ecological thresholds, or tipping points, entire ecosystems can shift from one dominant state to another. For example, a productive and resilient coral reef ecosystem could become an algal dominated wasteland as a result of the cumulative combination of nutrient inputs, warming ocean temperatures, and increased fishing pressure. It is true that not all marine ecosystems demonstrate tipping point behavior, but even those agencies making decisions in systems that have a more linear stressor-response curve should be wary of incomplete or inaccurate cumulative impacts analyses. Every system has a breaking point; declines are often just more measurable and predictable in ecosystems with linear stressor-responses than their nonlinear counterparts. With these consequences looming, a more precautionary approach to cumulative impacts analyses that better accounts for the numbers, types, and interactions of different stressors and builds in a buffer to account for uncertainty should be a top management priority.

Congress and the California Legislature recognized the potential for severe ecological impacts when they enacted NEPA and CEQA, respectively, over forty years ago and included provisions requiring

agencies to assess the cumulative impacts of their actions. However, as this Article illustrates, there are still gaps between the legal framework for cumulative impacts assessment, agency implementation of that framework, and agency integration of scientific knowledge about how impacts interact. As demonstrated here, the cumulative impacts assessments required by NEPA and CEQA are comprehensive. Indeed, it is arguable that developing a cumulative impacts assessment "to the letter of the law" may be near impossible absent unlimited scientific information at an agency's fingertips. The reality is that unlimited scientific information on cumulative impacts is not available, and uncertainty surrounding stressor interactions—and whether they are synergistic, antagonistic, or additive—remains high. While researchers continue to work steadily to quantify stressor interactions, a significant number of tools and information upon which agencies can improve and standardize cumulative impacts analyses may be obtained today. Fortunately, these incremental changes to "business as usual" cumulative impacts assessments represent actionable opportunities that are within agency's existing legal authorities.

This Article identifies several prevailing challenges to current cumulative impacts analyses, including difficulty analyzing like *effects* instead of like *projects*, selecting the appropriate baseline from which to judge whether the environmental impact a given project will be significant, how to include past and future impacts, and how to select the appropriate geographic scope of the analysis. Each section put forth a set of recommendations to begin to address each of these challenges. A variety of opportunities are available to federal agencies and California state agencies (both those operating under CEQA and those with Functional Equivalent Programs) to make adjustments to their current practices, ranging from basic actions that can be taken today (e.g., listing like impacts (instead of like projects) from both like projects *and* different projects with like impacts) to more complex actions that could be incorporated into future analyses with increased scientific understanding (e.g., consider all additive and interactive effects from all impacts in the project area). Section VI provides a summary list of recommendations made throughout the Article. Although the authors posit that many of these recommendations may require some updates to the guidelines or the statutory language to ensure consistent and standardized assessment practices instead of *ad hoc* approaches to analyses, they nonetheless remain consistent with

existing law and could be incorporated today.

Agencies have considerable discretion to implement the statutes within their jurisdiction, and cumulative impacts analyses requirements under NEPA, CEQA, and CEQA's Functional Equivalent Programs are no exception. Agencies that take incremental and progressively more sophisticated steps based on best available science will make measured and intentional progress towards more comprehensive and systematic cumulative impacts analyses. This progress will allow agencies to better account for the "thousand cuts" that our marine ecosystems continue to bear. As researchers develop a more nuanced understanding of how each "cut" interacts with the next, and just how many cuts any given system can handle, agencies can begin to make environmental planning decisions that more accurately account for multiple stressors that accumulate over space and time. These better-informed planning decisions represent precautionary decisionmaking, an approach that will alleviate stress to already impacted systems, maintain healthy systems, and build resilience across all ecosystem types.

VI. TWENTY-THREE LEGAL RECOMMENDATIONS FOR IMPROVING CUMULATIVE IMPACTS

Addressing Like Projects v. Like Impacts

1. Include a list of effects from past, other current, and future projects, rather than just listing those other like projects.
2. Establish searchable clearinghouse of all EAs, EISs, Initial Studies, EIRs, and FEPs to populate a list of like impacts.
3. Utilize GIS software or free mapping programs such as Google Earth to identify and map existing and planned development within a relevant geographic scope of the proposed project to identify like impacts.
4. Locate information on like impacts from past, other current, and future projects with related impacts through shared public data sources, including online data portals.
5. Consider additive and interactive effects where possible and monitor the scientific literature for new opportunities to address interactive effects.

Selecting an Appropriate Baseline

1. Consider historic trends data when setting the context for baseline selection.
2. Select an "ecologically grounded" baseline (whether past,

present, or future) that reflects basic ecological function.
3. Identify the appropriate project baseline with respect to relevant ecological thresholds and reference points.

Addressing Past Impacts

1. Assess *both* continuing impacts from past projects and past project impacts that have changed the system as examples of reasonably foreseeable changes.
2. List past projects and relevant qualitative data about their impacts in environmental review documents instead of aggregating past impacts.
3. Use a more precautionary approach in evaluating possible cumulative impacts if there is an absence of qualitative data such as the spatial and temporal relationship between events.
4. In addition to providing critical context, listing past project impacts relevant to the proposed project's cumulative effects analysis can limit conflation of relevant past impacts with determination of baseline.
5. Consult with sister agencies whose past information and decision documents regarding their own decisions in the proximity of the project at issue may provide valuable quantitative and qualitative data.

Incorporating Future Projects and Impacts

1. Establish the relevant time period during which each of the project's impacts will have an effect.
2. Identify future projects with relevant impacts that will occur within that same timeframe.
3. Find future projects and their impacts by consulting with sister agencies, referencing planning documents, and identifying notices of intent to develop EISs and EIRs.

Identifying Geographic Scope

1. Use a tiered approach to consider the impacts on local, regional, and global geographic scales.
2. Know where biogeographical regions are—and especially where bioregional breaks exist—to understand the context for cumulative impacts analyses.
3. Use a more precautionary approach for a proposed project at

or near a biogeographic break because the project may impact a broader range of species and habitat types and recovery may be slower than other areas.

4. Define the project impact zone.
5. Limit the scope to identifying priority species of interest that would be impacted by the project.
6. Focus on legally protected species and key indicator species, where identified.
7. Apply key ecological principles describing species diversity, habitat diversity and heterogeneity, populations of key species, and connectivity of species, to understand the potential reach of project impacts on these species and resources.