NEPA's Scientific and Information Standards—Taking the Harder Look

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I. Introduction and Scope

Scientific analyses and information are at the core of the National Environmental Policy Act's rational decision-making model for federal agencies and the consideration of a project's likely environmental consequences. While the Council on Environmental Quality regulations provide that an environmental impact statement's alternatives section "is the heart" of the EIS, it is "[a]ccurate scientific analysis, expert agency comments, and public scrutiny" that are essential to implementing NEPA.[1]

In earlier papers,[2] for which this paper essentially serves as part III of a trilogy, we explored the shifting patterns in judicial review of federal agencies' scientific assessments of environmental impacts under NEPA. We noted that "courts increasingly are looking past the agency's science-based conclusions and are probing deeper into the data, models, methodologies, and assumptions that underlie the agency's [scientific] assessment."[3] We concluded in 2007 that "courts are taking a 'harder look' than ever before at the scientific information and analyses used in federal agency NEPA decisions."[4]

Following our 2007 paper, the Ninth Circuit in *Lands Council v. McNair*[5] decided what was described in some corners as "the most important decision involving a [federal agency] environmental case in the last two decades,"[6] and a possible watershed in judicial review of agency NEPA actions, suggesting a return to a more deferential role for judicial review.[7]

In our subsequent 2011 paper, we hypothesized, a few years after the *McNair* decision, that

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[1] 40 C.F.R. §§ 1500.1(b), 1502.14.

[2] Murray D. Feldman, Michael J. Brennan, & Hadassah M. Reimer, "Of Hard Looks, Reason, and Agency Expertise: Shifting Standards For Implementing NEPA's Scientific Analysis Requirements," 53 *Rocky Mtn. Min. L. Inst.* 8-1, 8-3 (2007); Murray D. Feldman, "Taking A Harder Look At Direct, Indirect, and Cumulative Impacts," 48 *Rocky Mtn. Min. L. Found. J.* 319 (2011). This paper builds on and draws from those prior works. The background and conclusion sections here draw heavily from those prior papers.

[3] Feldman et al., *supra* n.2, at 8-3.

[4] *Id*.

[5] 537 F.3d 981 (9th Cir. 2008) (en banc).

[6] Statement of Mark Rey, former Undersecretary for Natural Resources and the Environment, U.S. Dep't of Agric., quoted in Keith G. Bauerle, "The Ninth Circuit's 'Clarifications' in *Lands Council v. McNair*: Much Ado About Nothing," 2 *Golden Gate Envtl. L.J.* 203, 231 (2009).

[7] *See, e.g.*, Camisha Sawtelle, Case Summary, "*Lands Council v. McNair*, 537 F.3d 981 (9th Cir. 2008)," 31 *Pub. Land & Resources L. Rev.* 161 (2009) ("*McNair* shows a shift in the approach of the . . . Ninth Circuit in reviewing [Forest Service] actions . . . . The court's decision . . . marks a step back towards deference to the agency experts.").

> *McNair* at first appeared to mark the end of the shift toward "harder look" review under NEPA. But, as in many areas of the law, decisions subsequent to *McNair* show that the debate highlighted in the original panel decision continues. By whatever standard and whatever name, courts in the Ninth Circuit and elsewhere are continuing with "harder look" review under NEPA.[8]

In this paper, we seek to further test that hypothesis. Did *McNair* signal a fundamental shift in judicial review of the use scientific information and analyses in federal agency NEPA decisions, or was it more of a restatement or revision of the existing NEPA judicial review procedures? Similarly, has the harder look we previously described continued in application after *McNair*, or has its influence been attenuated?

To explore these questions, we undertook an empirical review of the substantive and applicable federal court NEPA cases citing to *Lands Council v. McNair* and decided since November 2010, the cutoff date of our prior evaluation of this issue. Our review focused primarily on cases in the federal circuit courts of appeals, particularly those in the Ninth Circuit. We also reviewed cases citing to the CEQ's regulations addressing the use of scientific information in NEPA documents,[9] again focusing primarily on circuit court decisions.

As detailed below, our conclusion from this empirical review—echoed in the law review literature—is that *McNair* has not provided "a sea change but rather a course correction in line with traditional tenets of administrative law and judicial deference to agency decisions."[10] At the same time, as the post-*McNair* decisions here show, continuing a trend we previously identified, the federal courts' application of the harder-look standard persists. Also, the harder-look standard is not limited to the Ninth Circuit, but is reflected in many NEPA decisions across numerous federal circuits, and indeed can be seen in other environmental law contexts outside of NEPA, including the Endangered Species Act. The prevalence of this heightened judicial inquiry does not mean that every challenged agency NEPA decision is subject to harder-look review, but it does mean that in appropriate circumstances, and where the arguments and issues are framed by challengers so as to facilitate harder-look review, the courts may as a practical matter apply that standard to review an agency's use and application of scientific information in NEPA decision making.

In this paper we describe the circumstances when the harder-look standard may be applied, explain why the shift to harder-look review may be continuing, and provide practical suggestions for practitioners—both those preparing and commenting on agency NEPA

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[8] Feldman, *supra* n.2, at 352.

[9] *E.g.*, 40 C.F.R. §§ 1502.9, 1502.22, 1502.24.

[10] Bauerle, *supra* note 6, at 205. *See also*, Michael C. Blumm & Maggie Hall, "*Lands Council, Karuk Tribe*, and the Great Environmental Divide in the Ninth Circuit," 54 *Nat. Resources J.* 1, 3 (2014) (evidence of *McNair* "ushering in a new era of more deferential review of agency decisions . . . in environmental cases" has been scarce; "several recent decisions suggest . . . 'hard look' review in environmental cases is continuing").

documents and those litigating agency NEPA decisions—for working under and with this harder-look standard.

II. Statutory and Regulatory Framework

A. NEPA's Twin Goals

NEPA's twin goals are: (1) to foster informed decision making by "ensur[ing] that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts," and (2) to promote informed public participation by requiring full disclosure of and opportunities for the public to participate in governmental decisions affecting environmental quality.[11] To that end, agencies must disclose the scientific information and analyses on which they rely in their environmental effects analyses and decision-making processes.

B. NEPA's Action-Forcing Provisions

NEPA requires the preparation of an EIS for every "major Federal action[] significantly affecting the quality of the human environment."[12] An EIS, among other things, details "the environmental impact of the proposed action," "any adverse environmental effects which cannot be avoided should the proposal be implemented," and "alternatives to the proposed action."[13] An agency may first prepare an environmental assessment to aid in its implementation of NEPA and to determine whether the effects of the action will be significant, requiring analysis in an EIS.[14] If the agency determines that the effects of the proposed action will not be significant, the agency will issue a finding of no significant impact and the preparation of an EIS is not required.[15] But the EA's FONSI determination must still be supported by the agency's record and any applicable scientific information and analysis. While NEPA does not require a particular substantive outcome, it does require "agencies to take a 'hard look' at how the choices before them affect the environment, and then to place their data and conclusions before the public."[16]

C. NEPA's Scientific Information and Data Requirements

NEPA requires agencies to "[u]tilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in

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[11] Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 349-50 (1989). *See also* 40 C.F.R. § 1500.1(b), (c).

[12] 42 U.S.C. § 4332(2)(C).

[13] *Id.* § 4332(2)(C)(i)-(iii).

[14] 40 C.F.R. §§ 1501.4, 1508.9.

[15] *Id.* § 1508.13.

[16] W. Watersheds Project v. Abbey, 719 F.3d 1035, 1047 (9th Cir. 2013) (internal quotation and citation omitted).

planning and in decisionmaking which may have an impact on man's environment."[17] "In the language of the case law, NEPA thus broadly requires that the [agency] take a 'hard look' at the environmental consequences of its actions."[18]

The CEQ's NEPA regulations, binding on all federal agencies,[19] provide standards for an EIS's information requirements and preparation.[20] An EIS must clearly present information and analysis of the environmental consequences that form the scientific and analytic basis for consideration of reasonable alternatives.[21] In preparing an EIS, agencies must "insure the professional . . . [and] scientific integrity, of the discussions and analyses in environmental impact statements."[22] In so doing, they must identify the methodologies used, and must explicitly refer to the scientific and other sources of information relied upon for conclusions set forth in the EIS.[23] The information included in an EIS "must be of a high quality," and must allow for "[a]ccurate scientific analysis, expert agency comments, and public scrutiny."[24] The agency must also discuss responsible opposing views.[25] At the same time, EISs should not be encyclopedic, but rather "concise, clear, and to the point, and . . . supported by evidence that agencies have made the necessary environmental analyses."[26] Impacts should be discussed in proportion to their significance, and "[d]ata and analyses in a statement shall be commensurate with the importance of the impact" of the proposed action or its alternatives.[27]

When information "relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives," the CEQ regulations require that the agency either: (1) determine that the cost of obtaining such information is "exorbitant or the means to obtain it are not known," or (2) obtain the information and include it in the EIS.[28] NEPA's

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[17] 42 U.S.C. § 4332(2)(A).

[18] Sierra Club v. Marita, 46 F.3d 606, 616 (7th Cir. 1995) (citing *Methow Valley*, 490 U.S. at 350).

[19] ONRC Action v. BLM, 150 F.3d 1132, 1138 n.3 (9th Cir. 1998).

[20] 40 C.F.R. pt. 1500. In some instances, federal departments and agencies have promulgated additional regulations governing applicable NEPA standards. *See, e.g.*, 43 C.F.R. pt. 46 (specific NEPA regulations for agencies within the United States Department of the Interior); 36 C.F.R. pt. 220 (specific NEPA regulations for the United States Forest Service).

[21] 40 C.F.R. §§ 1502.14, 1502.16.

[22] *Id*. § 1502.24; *see also* Save the Peaks Coal. v. U.S. Forest Serv., 669 F.3d 1025, 1037-38 (9th Cir. 2015) (agencies have a "duty to ensure the scientific integrity of the [EISs] discussion and analysis"); League of Wilderness Defenders-Blue Mountains Biodiversity Project v. U.S. Forest Serv., 689 F.3d 1060, 1073-75 (9th Cir. 2012) (an agency must "ensure the 'scientific integrity' of the discussions and analyses in an EIS" (quoting 40 C.F.R. § 1502.24)).

[23] 40 C.F.R. § 1502.24.

[24] *Id*. § 1500.1(b).

[25] *Id.* § 1502.9(b).

[26] *Id.* §§ 1500.2(b), 1502.1.

[27] *Id.* §§ 1502.15, 1502.2.

[28] *Id*. § 1502.22.

purpose, however, is not "the accumulation of extraneous background data."[29] If obtaining the information is too costly or infeasible, the agency can forego its collection, in which case the agency must include in the EIS: (1) A statement that the information is incomplete or unavailable; (2) a statement of the relevance of the incomplete or unavailable information; (3) a summary of relevant "existing credible scientific evidence;" and (4) the agency's evaluation of impacts based on "theoretical approaches or research methods generally accepted in the scientific community."[30] The underlying purpose of the CEQ regulations is to ensure that agencies, to the greatest extent possible, have access to and include in environmental analyses all available information necessary to assess impacts and make a reasoned choice between alternatives.[31]

In sum, NEPA, its implementing regulations, and agency guidance all recognize that an effective impact analysis and an agency's choice among reasonable alternatives must be based on the review of relevant high-quality data and other information.

III. The Standard of Review and the "Harder Look"

A. The Standard of Review Framework for Judicial Review of NEPA Decisions

NEPA decisions are reviewed in federal court under the Administrative Procedure Act.[32] Subsections 706(2)(A) and (D) authorize a reviewing court to hold unlawful and set aside agency action found to be arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law; or without observance of procedure required by law.[33] In NEPA cases, this standard of review incorporates a "rule of reason" whereby the court makes a "pragmatic judgment whether the EIS's form, content and preparation foster both informed decision making and informed public participation."[34]

Courts have generally deferred to the agency's choices on questions of the proper weight to give various scientific information and impact assessment determinations, particularly if those questions implicate the agency's area of expertise.[35] While the overall standard of review is

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[29] *Id*. § 1500.2(b).

[30] *Id*. § 1502.22(b).

[31] *See id.* §§ 1500.1, 1502.14.

[32] 5 U.S.C. § 706.

[33] *Id*. § 706(2)(A), (D).

[34] Native Ecosystems Council v. U.S. Forest Serv., 418 F.3d 953, 960 (9th Cir. 2005) (quoting California v. Block, 690 F.2d 753, 761 (9th Cir. 1982)).

[35] *See* Marsh v. Or. Nat. Res. Council, 490 U.S. 360, 378 (1989); Baltimore Gas & Elec. Co. v. Nat. Res. Def. Council, 462 U.S. 87, 103 (1983); *see also* Lands Council v. McNair, 629 F.3d 1070, 1074 (9th Cir. 2010) ("[W]e generally must be at our most deferential when reviewing scientific judgments and technical analyses within the agency's expertise."); Alaska Oil & Gas Ass'n v. Pritzker, 840 F.3d 671, 679 (9th Cir. 2016) ("We have stressed that 'we must defer to' the agency's interpretation of complex scientific data so long as the agency provides a reasonable explanation for adopting its approach and discloses the limitations of that approach."), *petitions for cert. filed*, Nos. 17-118, 17-133 (U.S. July 21, 2017). Some commentators have referred to this traditional rule as the courts' encouragement of "super-deference" to an agency's scientific determination, especially one made at the "frontiers of scientific

narrow, the court must still ensure that the agency examined the relevant factors and articulated a satisfactory explanation for its actions.[36] The court must " 'steep' itself in technical matters sufficiently to determine whether the agency 'has exercised reasoned discretion.' "[37] Furthermore, if the agency has failed to articulate "a rational connection between the facts found and the choice made," the agency's decision cannot be upheld.[38] If the agency takes a " 'hard look' at the environmental consequences of the proposed action, the court will not second-guess the wisdom of the ultimate decision."[39] And more broadly, the "APA does not allow the court to overturn an agency decision because it disagrees with the decision or with the agency's conclusions about environmental impacts."[40]

In reviewing NEPA cases, it is easy to skip past these familiar administrative law and judicial review principles to get into the heart of the case without considering the degree to which the court's decision-making was guided by, or comports with, those standards. As in our prior considerations of these issues, this paper focuses specifically on that latter question, in the context of judicial review of agency compliance with NEPA's scientific analysis and impact assessment requirements.

B. The Transition from the Hard Look to the "Harder Look"

Courts continue to recognize the established formulations of the "hard look," "rule of reason," and "arbitrary and capricious" articulations of the standard of review in NEPA cases. Nonetheless, in the past two decades—since at least 1998 if not earlier—the federal courts have begun to dig deeper into the administrative record and review more closely whether agencies have met the CEQ requirements for high-quality information, accurate scientific analyses, expert agency comments, public scrutiny, and the professional and scientific integrity of the environmental analyses used in NEPA documents. We call this phenomenon "harder-look" judicial review. In the next subsections, we trace the development of the harder-look standard in the Ninth Circuit. Then in the following section we note and provide several examples of the continuing application, both within and without the Ninth Circuit, of harder-look review.

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knowledge." Thomas O. McGarity & Wendy E. Wagner, "Legal Aspects of the Regulatory Use of Environmental Modeling," 33 *Envtl. L. Rep.* (*Envtl. Law Inst.*) 10751, 10757 n.44 (2003) (citing *Baltimore Gas & Elec.*, 462 U.S. at 103).

[36] *See* Motor Vehicle Mfrs. Ass'n of the U.S. v. State Farm Mut. Auto Ins. Co., 463 U.S. 29, 43 (1983).

[37] Chemical Mfrs. Ass'n v. EPA, 870 F.2d 177, 199 (5th Cir. 1989) (internal quotation and citation omitted); *see also* Mississippi River Basin All. v. Westphal, 230 F.3d 170, 174-75 (5th Cir. 2000).

[38] *State Farm*, 463 U.S. at 43 (internal quotation and citation omitted).

[39] Utahns for Better Transp. v. U.S. Dep't of Transp., 305 F.3d 1152, 1163 (10th Cir. 2002); Ctr. for Biological Diversity v. Dept. of Interior, 623 F.3d 633, 641 (9th Cir. 2010) (reviewing court's role is to "ensure that the agency has taken a 'hard look' at the environmental consequences of its proposed action").

[40] River Runners for Wilderness v. Martin, 593 F.3d 1064, 1070 (9th Cir. 2010).

C. *Ecology Center v. Austin*—A Turning Point

An early example of harder-look judicial inquiry into the substantive components of agency NEPA decisions is the Ninth Circuit's decision in *Ecology Center, Inc. v. Austin*.[41] Although later overruled by the *en banc* panel in *McNair*, the *Ecology Center* decision is still important background in understanding the development of harder-look review. In a 2-1 split panel decision, the Ninth Circuit held that the Forest Service violated NEPA by failing to verify, with representative field sampling, the soils modeling used to predict the impacts of a proposed post-burn forest restoration project, which included the thinning of small diameter timber, prescribed burning in old-growth forest stands, and salvage logging of burned and insect-killed timber in the project area.[42]

The Ninth Circuit held in *Ecology Center* that the same lack of field verification of the agency's spreadsheet model violated NEPA in two ways. First, the Forest Service could not avoid an obligation to verify the model's approach to documenting compliance with the Regional Soil Quality Standard because the project EIS treated that Standard as binding.[43] Second, the EIS approach to "verify soil conditions in the activity areas after authorizing the project, but before actually commencing [timber] harvesting activities," could not cure the lack of field verification of the reliability of the agency's model.[44] "NEPA requires consideration of the potential impact of an action *before* the action takes place."[45]

The *Ecology Center* majority's application of harder-look review was criticized by Judge Margaret McKeown in her dissenting opinion. She stated that "there is no legal basis to conclude that [NEPA] requires an on-site analysis where there is a reasonable scientific basis to uphold the legitimacy of modeling."[46] Judge McKeown declared that the majority's holding "represents an unprecedented incursion into the administrative process and ratchets up the scrutiny we apply to the scientific and administrative judgments of the Forest Service. . . . [T]he majority has, in effect, displaced 'arbitrary and capricious' review for a more demanding standard."[47] Judge McKeown further observed:

> Apparently we no longer simply determine whether the Forest Service's methodology involves a "hard look" through the use of "hard data," but now are called upon to make fine-grained judgments of its worth. In reaching this conclusion, the majority takes aim at two firmly established lines of precedent in administrative law. First, this view is contrary to the basic principle that we reverse agency decisions only if they are arbitrary

[41] 430 F.3d 1057 (9th Cir. 2005), *cert. denied*, 127 S. Ct. 931 (2007).

[42] *Id*. at 1061, 1070-71.

[43] *Id*. at 1069.

[44] *Id*. at 1071.

[45] *Id*. (quoting Neighbors of Cuddy Mtn. v. U.S. Forest Serv., 137 F.3d 1372, 1380 (9th Cir. 1998)).

[46] *Id*. at 1073 (McKeown, J., dissenting).

[47] *Id*. at 1072 (McKeown, J., dissenting).

> and capricious. This standard of review does not direct us to literally dig in the dirt (or soil, as it were), get our fingernails dirty and flyspeck the agency's analysis. Yet the majority does exactly that by rejecting the Forest Service's soil analysis field checks and its observations and historical data in treated old-growth forests. [Second, t]he majority's rationale cannot be reconciled with our caselaw requiring "[d]eference to an agency's technical expertise and experience," particularly "with respect to questions involving engineering and scientific matters."[48]

D. *Lands Council v. McNair*—Hitting the Pause Button on Harder-Look Review?

In the initial panel decision in *Lands Council v. McNair*,[49] the Ninth Circuit held, in the preliminary injunction context of reviewing whether plaintiffs had shown a likelihood of success on the merits that a Forest Service timber management and logging project violated NEPA, that the agency "failed to include a full discussion of the scientific uncertainty surrounding its strategy for improving wildlife habitat."[50] The challenged EIS "treats the prediction that treatment will benefit old-growth dependent species as a fact instead of an untested and debated hypothesis."[51] Thus, the court held, the Forest Service failed to address in a "meaningful way the various uncertainties surrounding the scientific evidence" concerning the probable environmental effects of its action,[52] thwarting NEPA's purposes of informed decision making and informed public disclosure.[53]

Judge Milan Smith, Jr., wrote a special concurrence in *McNair* to note that while the Ninth Circuit's *Ecology Center* decision was binding circuit law and controlled the outcome in *McNair*, he like Judge McKeown "believe[s] that *Ecology Center* was wrongly decided."[54] Judge Smith wrote that following *Ecology Center* in *McNair* "compounds already serious errors of federal law"[55] and required the court to move from "simply determin[ing] whether the Forest Service's methodology involves a 'hard look' through the use of 'hard data' to mak[ing] fine-grained judgments of its worth."

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[48] *Id*. at 1077 (McKeown, J., dissenting) (quoting United States v. Alpine Land & Reservoir Co., 887 F.2d 207, 213 (9th Cir. 1989) and citing Westlands Water Dist. v. U.S. Dep't of Interior, 376 F.3d 853, 871 (9th Cir. 2004)).

[49] 494 F.3d 771 (9th Cir. 2007).

[50] 494 F.3d at 778.

[51] *Id.* (*citing* and *quoting Ecology Ctr.*, 430 F.3d at 1065).

[52] *See id.* (*quoting Ecology Ctr.*, 430 F.3d at 1065).

[53] *Id.*; *see also Ecology Ctr.*, 430 F.3d at 1067 ("the information in the . . . EIS was so incomplete or misleading that the decisionmaker and the public could not make an informed comparison of the alternatives").

[54] *McNair*, 494 F.3d at 780 (Smith, J., specially concurring).

[55] *Id.* at 782.

Following the Ninth Circuit panel decision in *McNair*, the Ninth Circuit granted rehearing *en banc*. Judge Smith wrote the decision for the *en banc* court "to clarify some of our environmental jurisprudence with respect to our review of actions of the United States Forest Service."[56] The *en banc* court vacated the panel decision and affirmed the original district court's decision denying the preliminary injunction.

In setting forth the standard of review for the determination of the likelihood of success on the merits as part of the preliminary injunction claim, the *en banc* court reiterated that its review was under the APA's arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law standard,[57] and that such review "is narrow, and [we do] not substitute [our] judgment for that of the agency."[58] The Court first reviewed the National Forest Management Act claims, and in doing so explicitly overruled the Ninth Circuit's earlier *Ecology Center* decision.[59] The *en banc* court in *McNair* specifically rejected the broad rule "grafted onto our jurisprudence" in *Ecology Center* that, "in effect, requires the Forest Service to always 'demonstrate the reliability of its scientific methodology' or the hypotheses underlying the Service's methodology with 'on the ground analysis.' "[60] As Judge Smith wrote:

> We made three key errors in *Ecology Center*. First, we read the holding of *Lands Council I* too broadly. Second, we created a requirement not found in any relevant statute or regulation. And, third, we defied well-established law concerning the deference we owe to agencies and their methodological choices. Today, we correct those errors.[61]

The *McNair* court went on to hold that the Forest Service was free to use on-the-ground analysis if it deemed it appropriate or necessary, but it was not required to do so.[62]

> Granting the Forest Service the latitude to decide how best to demonstrate that its plans will provide for wildlife viability comports with our reluctance to require an agency to show us, by any particular means, that it has met the requirements of the NFMA every time it proposes action. . . . Were we to grant less deference to the agency, we would be ignoring the APA's arbitrary and capricious standard of review. *Ecology Center* illustrates the

[56] *McNair*, 537 F.3d at 984.

[57] *Id*. at 987 (citing 5 U.S.C. § 706(2)(A)).

[58] *Id*. at 987 (quoting *Earth Island Inst. v. U.S. Forest Serv.*, 442 F.3d 1147, 1156 (9th Cir. 2006)).

[59] *See id*. at 990 (overruling *Ecology Center, Inc. v. Austin*, 430 F.3d 1057 (9th Cir. 2005)).

[60] *Id*. at 990 (quoting *Ecology Ctr*., 430 F.3d at 1064)).

[61] *Id*. at 991.

[62] *Id*. at 991-92.

> consequences of failing to grant appropriate deference to an agency.[63]

Thus, the court concluded, for the NFMA claims,

> As non-scientists, we decline to impose bright-line rules on the Forest Service regarding particular means that it must take in every case to show us that it has met the NFMA's requirements. Rather, we hold that the Forest Service must support its conclusions that a project meets the requirements of the NFMA and relevant Forest Plan with studies that the agency, in its expertise, deems reliable. The Forest Service must explain the conclusions it has drawn from its chosen methodology, and the reasons it considers the underlying evidence to be reliable. We will conclude that the Forest Service acts arbitrarily and capriciously only when the record plainly demonstrates that the Forest Service made a clear error in judgment in concluding that a project meets the requirements of the NMFS and relevant Forest Plan."[64]

The court then addressed the plaintiffs' NEPA claims. There, the court noted that "NEPA, unlike the NFMA, does not impose any substantive requirements on federal agencies—it exists to ensure a process."[65] "To that end," the court stated, "NEPA requires agencies to take a 'hard look' at the environmental consequences of their actions by preparing an EIS for each 'major Federal action[ ] significantly affecting the quality of the human environment.' "[66] According to the *en banc* court, "none of NEPA's statutory provisions or regulations requires the Forest Service to affirmatively present every uncertainty in its EIS. Thus, we hold that to the extent our caselaw suggests that a NEPA violation occurs every time the Forest Service does not affirmatively address an uncertainty in the EIS, we have erred."[67] After all, "to require the Forest Service to affirmatively present every uncertainty in its EIS would be an onerous requirement, given that experts in every scientific field routinely disagree; such a requirement might inadvertently prevent the Forest Service from acting due to the burden it would impose."[68]

The *McNair* court still reaffirmed "that the Forest Service must acknowledge and respond to comments by outside parties that raise significant scientific uncertainties and reasonably support that such uncertainties exist."[69] The Forest Service "does not, however, have the burden to anticipate questions that are not necessary to its analysis, or to respond to uncertainties that are

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[63] *Id*. at 992.

[64] *Id*. at 993-94.

[65] *Id.* at 1000 (internal quotation omitted).

[66] *Id.* at 1000-01 (quoting 42 U.S.C. § 4332(C)) (alteration by court).

[67] *Id*. at 1001.

[68] *Id.*

[69] *Id.*

not reasonably supported by any scientific authority."[70] After restating these standards, the *en banc* court then considered whether the Forest Service had violated NEPA in this instance by failing to address scientific uncertainty. The plaintiffs had relied on two papers cited in its administrative appeal to demonstrate that the Forest Service did not adequately address scientific uncertainty in its NEPA analysis. The *en banc* court determined that the Forest Service's discussion of these papers in the EIS was adequate because the Forest Service had undertaken the area-specific research and "field reconnaissance" in the project area called for in one of the papers, and had discussed how the treatment it proposed, which it also modeled, would maintain the dry-forest, old-growth stands, and the agency cited literature explaining that the proposed treatments would improve tree vigor and resistance to insects and disease.[71]

In sum, the court concluded that the Forest Service did not ignore the potential for adverse impacts from logging in old-growth forest stands, but instead explained adequately that its actions would not decrease suitable habitat in the short-term and would enhance it in the long-term.[72] Also, the court approved of the Forest Service's approach to use habitat as a proxy for wildlife effects when "the Forest Service concludes, in its expertise, that it is reasonable to assume that a project will maintain a species' viability if the project will maintain suitable habitat for the species."[73]

> Though the Forest Service must explain the methodology it used for its habitat suitability analysis, which the Forest Service did here, NEPA does not require us to "decide whether an [EIS] is based on the best scientific methodology available." *See Friends of Endangered Species, Inc. v. Jantzen*, 760 F.2d 976, 986 (9th Cir. 1985) (citations omitted), And, we will not find a NEPA violation based on the Forest Service's use of an assumption that we approve.[74]

Thus, the court concluded that the Forest Service "took the requisite 'hard look' at the environmental impacts of the Project to satisfy NEPA."[75]

E. Continuing the Harder Look After *McNair*

The *en banc* decision in *McNair* at first appeared to mark the end of the shift toward harder-look review under NEPA. But, as in many areas of the law, decisions subsequent to *McNair* show that the debate highlighted in the original panel decision continues. By whatever standard and whatever name, courts in the Ninth Circuit and elsewhere are continuing with harder-look review under NEPA.

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[70] *Id.* at 1002.

[71] *Id.* at 1002-03.

[72] *Id.* at 1003.

[73] *Id.*

[74] *Id.* at 1003.

[75] *Id.*

We first highlighted the ongoing application for harder-look review in our 2011 paper. In our case review below, we note the continued application of that standard, despite suggestions to the contrary in *McNair,* across a variety of NEPA areas concerning scientific information. The case review below is organized around five key areas of judicial review of agency scientific decision making under NEPA reflecting the same areas described in our earlier papers.

IV. Contemporary Issues in Harder-Look Review

As noted in those earlier papers, scientific information and data continue to play an increasingly important role in environmental effects analyses. As information, analytic methods, and models improve, agencies can better predict the possible effects that their decisions may have on the human environment. Better data and better models, however, come at increasing costs in time and other resources for agencies, project proponents, and stakeholders. How much data is enough, and whether and which predictive model to choose, are difficult questions that require agencies to balance the utility of the information in the decision-making process on the one hand with the costs of obtaining the information on the other. The outcome of such inquiries is highly fact-specific and varies with the nature of the potential project and the resources it might affect. However, some basic patterns are repeated in the caselaw.

In the following sections, this paper, building on our previous efforts, highlights continuing trends in judicial review of NEPA's scientific information standards and requirements in the context of the following questions.

- How much data is enough in a NEPA analysis?
- When should an agency fill apparent data gaps?
- When should an agency collect more current or arguably more representative information?
- How should an agency address opposing scientific views?
- How should an agency choose and apply the appropriate methods and models for evaluating environmental effects?

A. Data Sufficiency

An agency's review of existing information on possible environmental effects of a proposed action may not be sufficient under NEPA where additional information is necessary to make a reasoned choice among alternatives.[76] An agency also violates NEPA when it fails to provide a reasoned explanation to support its decision regarding the adequacy of its data.[77] For

[76] *See, e.g.*, Pub. Emps. for Envtl. Responsibility v. Hopper, 827 F.3d 1077, 1083 (D.C. Cir. 2016) (remanding EIS to the agency for preparation of geological surveys because it may be appropriate for the agency to conduct additional monitoring to gather more data going forward, but it "does not excuse the [agency] from its NEPA obligation to gather data about the [environmental consequences of its action]").

[77] W. Watersheds Project v. BLM, 2015 WL 846548, at *10-11 (D. Ariz. Feb. 26, 2015) (among other deficiencies, BLM failed to provide any explanation for its decision to rely on a single year of utilization data in determining whether failure to achieve land health standards was caused by livestock use); *see*

instance, in *Great Basin Resource Watch v. Bureau of Land Management*,[78] the Ninth Circuit rejected a portion of BLM's air quality analysis in evaluating the effects of a molybdenum operation because it relied only on a single email from a state agency official that failed to explain how or why BLM selected a baseline value of zero for certain air pollutants. In doing so, the court explained that BLM's EIS was inadequate given that "[t]his important information, which affects the air impacts analysis, was essentially immune from meaningful scrutiny by the public because the BLM never provided any data or reasoning in support of it."[79]

In recent years, courts have focused on an agency's obligation to adequately assess baseline data as part of its environmental analysis.[80] In *Oregon Natural Desert Association v. Jewell*,[81] the Ninth Circuit reversed and remanded BLM's approval of a wind energy project based on its failure to conduct surveys in order to determine whether sage grouse were present at the project site in the winter months, despite the potential conflict between the proposed location of the wind energy project and greater sage-grouse winter foraging habitat. As opposed to preparing surveys for the project site, BLM relied on an extrapolation from surveys conducted on nearby sites to conclude that no sage grouse winter habitat was present at the project site. The court rejected BLM's reliance on extrapolated surveys because:

> Without appropriate data regarding sage grouse use of the [project] site during the winter, whether direct or via a supportable extrapolation, it was

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also Sequoia Forestkeeper v. Benson, 108 F.Supp.3d 917, 935 (E.D. Cal. 2015) (NEPA requires that "the Forest Service 'set forth a reasoned explanation' for its decision to remove trees from the Monument and not 'simply assert that its decision will have an insignificant effect' ").

[78] 844 F.3d 1095 (9th Cir. 2016); *see also* WildEarth Guardians v. U.S. Forest Serv., 870 F.3d 1222, 1235 (10th Cir. 2017) (rejecting BLM's assumption that unleased coal under the no action alternative would be substituted by other coal sources because it "falls below the required level of data necessary to reasonably bolster [BLM's] choice of alternatives"); *but see* Earth Island Inst. v. U.S. Forest Serv., 697 F.3d 1010, 1019-20 (9th Cir. 2012) (upholding the Forest Service's analysis of the black-backed woodpecker's geographic distribution based on data collected from "monitoring that takes place at various sample locations by avian point counts, spot mapping, mist-netting, and breeding bird survey protocols," particularly where its conclusions were further supported by other scientific reports and studies); Sierra Club v. Fed. Hwy. Admin., 435 F. App'x 368, 377 (5th Cir. 2011) (upholding agency's floodplain analysis because the Federal Highway Administration "clearly disclosed" the underlying basis for its floodplain data and provided "sufficient detail to allow those who did not participate in the preparation of the FEIS to understand how the FEIS arrived at the calculated number of floodplain acres"); Latin Americans for Social & Econ. Dev. v. Fed. Hwy. Admin., 756 F.3d 447, 473 (6th Cir. 2014) (upholding use of traffic projections in international bridge project because the agency "did not ignore current actual data, but extensively evaluated that information in the context of the . . . project's purpose and needs, earlier projections, and factors affecting traffic volume").

[79] *Great Basin Res. Watch*, 844 F.3d at 1103.

[80] *See* N. Plains Res. Council v. Surface Transp. Bd., 668 F.3d 1067, 1085 (9th Cir. 2011) (rejecting "[t]he use of mitigation measures as a proxy for baseline data"); *see also* Openlands v. U.S. Dep't of Transp., 124 F.Supp.3d 796, 806 (N.D. Ill. 2015) (rejecting baseline forecasts that assumed the existence of the project under consideration).

[81] 840 F.3d 562, 568-70 (9th Cir. 2016).

> not possible to begin to assess whether sage grouse would be impacted with regard to access to viable sagebrush habitat in the winter months.[82]

While the Ninth Circuit acknowledged the deference due BLM in reviewing the agency's scientific or technical analyses, the court nevertheless emphasized that "any such extrapolation must be based on accurate information and defensible reasoning."[83]

Moreover, an agency violates NEPA's public disclosure requirements when it provides quantitative information regarding environmental impacts without providing appropriate references to the underlying source of the information. In *WildEarth Guardians v. Montana Snowmobile Association*,[84] the Ninth Circuit found that the Forest Service failed to disclose the geographic location of big game winter range or its concentration in the project area in analyzing snowmobile use in the Beaverhead-Deerlodge National Forest. While the Forest Service pointed to several places in the EIS which allegedly contained the missing information, the court rejected the Forest Service's efforts because, among other reasons, the EIS did not explain that the referenced information was intended to act "as a proxy for a map of the big game winter range" and was not ultimately used as part of the agency's final analysis.[85] Thus, "[w]ithout data on the location of the big game winter range, the public was severely limited in its ability to participate in the decision-making process."[86]

B. Data Gaps—Incomplete or Insufficient Information

In evaluating reasonably foreseeable significant adverse effects, agencies must address incomplete or insufficient information.[87] Courts have applied the rule of reason to an agency's handling of incomplete or unavailable information.[88] For instance, the Ninth Circuit recently upheld the Forest Service's analysis of project alternatives because, even though the Forest Service did not ascertain the total wolf population in the project area, the Forest Service relied on other information, such as changes in deer habitat and road density, in order to evaluate population capacities and impacts amongst the various alternatives.[89] Since precise wolf population figures were not essential to a reasoned choice amongst alternatives, the "Forest

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[82] *Id*. at 570.

[83] *Id*.

[84] 790 F.3d 920, 924-28 (9th Cir. 2015).

[85] *Id*. at 926.

[86] *Id*. at 926; *see also Great Basin Res. Watch*, 844 F.3d at 1103.

[87] 40 C.F.R. § 1502.22.

[88] Habitat Educ. Ctr. v. U.S. Forest Serv., 673 F.3d 518, 531 (7th Cir. 2012) ("compliance with § 1502.22 is subject to the 'rule of reason'" (quoting 40 C.F.R. § 1502.22(b))); *cf.* Webster v. Dep't of Agric., 685 F.3d 411, 426 (4th Cir. 2012) (declining to "second-guess the agency's decision to omit [missing information]" where the plaintiffs failed to explain the significance of the missing information and the "consequentiality of [its] omission [was] not readily apparent to [the court]").

[89] In re Big Thorne Project & 2008 Tongass Forest Plan, 691 F. App'x 417, 419-20 (9th Cir. 2017).

Service only needed to acknowledge that it lacked precise population estimates to comply with NEPA."[90]

In another example, the Ninth Circuit held that the Bureau of Ocean Energy Management did not run afoul of Section 1502.22(a) because a detailed discussion of missing information on animal populations that could be affected by offshore oil and gas exploration and production was not essential to informed decision making at the leasing stage and future site-specific NEPA analyses would be conducted at later stages.[91] Just as courts do not require agencies to prepare a detailed statement when the information is not essential to a reasoned choice among alternatives,[92] an agency need not provide a detailed statement when the corresponding impacts are not reasonably foreseeable.[93] This is because NEPA was not intended to create an "empty technicality—a requirement that agencies explicitly state that they lack knowledge about the details of potential future projects."[94]

Even when not specifically addressing the regulation governing unavailable or incomplete information, if the impacts of a project are uncertain or information is lacking, courts have upheld an agency's NEPA analysis so long as the agency considers potential impacts based on available information and discusses potential mitigation measures. In *Backcountry Dumps v. Jewell*,[95] plaintiffs argued that BLM violated NEPA because there were no available studies evaluating the impacts of a wind energy project on peninsular bighorn sheep and BLM failed to prepare an independent study to address those impacts. The Ninth Circuit held that BLM took the requisite hard look at peninsular bighorn sheep because although BLM did not prepare an independent study, it did consider information from other studies, such as impacts to bighorn sheep from other human activities and impacts of wind turbine facilities on mountain elk.[96] Thus, "[e]ven though the actual effects the [wind energy project] would have on the sheep were uncertain, we conclude the BLM took the requisite hard look, because it 'considered extensively' the potential impacts of the Project and the available mitigation measures."[97]

On the other hand, where an agency entirely failed to comply with the NEPA regulation governing incomplete or unavailable information, the agency action may be set aside. For example, in *Montana Wilderness Association v. McAllister*,[98] the Ninth Circuit held that the

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[90] *Id*. at 420 (citing 40 C.F.R. § 1502.22).

[91] Native Village of Point Hope v. Jewell, 740 F.3d 489, 496-99 (9th Cir. 2014).

[92] Pub. Emps. for Envtl. Responsibility v. Beaudreau, 25 F.Supp.3d 67, 125-26 (D.D.C. 2014) (finding 40 C.F.R. § 1502.22(a) inapplicable because the Fish and Wildlife Service in criticizing the Bureau of Ocean Energy Management's analysis "did not characterize the missing data as essential when it referenced those data in its own biological opinion").

[93] *Habitat Educ. Ctr.*, 673 F.3d at 531-32.

[94] *Id*. at 532 (quoting Habitat Educ. Ctr. v. U.S. Forest Serv., 609 F.3d 897, 902-03 (7th Cir. 2010)).

[95] 674 F. App'x 657 (9th Cir. 2017).

[96] *Id*. at 660-61.

[97] *Id*. at 661 (quoting Okanogan Highlands All. v. Williams, 236 F.3d 468, 477 (9th Cir. 2000)).

[98] 666 F.3d 549, 559-60 (9th Cir. 2011).

Forest Service incorrectly concluded that historical recreation use data was not relevant to its analysis of wilderness characteristics for the Gallatin National Forest travel management plan. The Forest Service's "failure to consider the impact of increased use volume on the study area's wilderness character caused it to ignore an important aspect of the problem before it."[99] Other courts have similarly held that an agency violates NEPA when it fails to disclose incomplete information that is relevant to its analysis.[100]

C. Stale Data

In at least one recent decision, the Ninth Circuit has not faulted an agency for relying on existing data so long as more recent or conflicting data did not exist. For example, in *League of Wilderness Defenders Blue Mountains Biodiversity Project v. Connaughton*,[101] the Ninth Circuit upheld a decision by the Forest Service and the Fish and Wildlife Service to rely on a 15-year old survey discussing the existence of bull trout in Eagle Creek. Despite the age of the survey, the agencies properly relied on it because there was no reliable evidence showing the survey's results were incorrect or that the status of the bull trout in Eagle Creek had changed over time.[102]

However, another recent Ninth Circuit decision suggests that reliance on stale data is arbitrary and capricious, even without more recent data in either the administrative record or offered by the plaintiff. In *Northern Plains Resource Council Inc. v. Surface Transportation Board*,[103] the Surface Transportation Board declined to conduct on-the-ground surveys as part of its environmental analysis for the approval of railroad applications, citing rough terrain, rural location, and limited access to private property. The Board instead relied on aerial surveys and photographs that had been used in previous environmental analyses, the most recent of which was ten years old at the time of its decision.[104] The Board argued that its reliance on the aerial surveys and photographs was proper because the physical environment was "substantially the same."[105] The court rejected the Board's argument because it failed to provide any scientific studies or testimony to support that conclusion and, even if true, it did not follow that species

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[99] *Id*. at 560; *see also* W. Watersheds Project v. Kraayenbrink, 632 F.3d 472, 493 (9th Cir. 2011) (holding that BLM failed to consider an important aspect of the problem by relying on monitoring data from less than one-third of grazing allotments and evaluating impacts without any data for the vast majority of the BLM-managed lands).

[100] *See, e.g.*, N.C. Wildlife Fed'n v. N.C. Dep't of Transp., 677 F.3d 596, 603 (4th Cir. 2012) (holding that "agencies violate NEPA when they fail to disclose that their analysis contains incomplete information").

[101] 752 F.3d 755, 763 (9th Cir. 2014).

[102] *Id*.; *see also* Alaska Survival v. Surface Transp. Bd., 705 F.3d 1073, 1088 (9th Cir. 2013) (rejecting the contention that the Surface Transportation Board relied on stale data from aerial surveys where plaintiffs "point[ed] to no evidence that the data was stale"); All. for the Wild Rockies v. Bulletts, 2016 WL 1734086, at *8 (D. Utah Apr. 29, 2016) (upholding reliance on allegedly stale scientific model because the Forest Service considered alternative literature and determined its selected model was appropriate).

[103] 668 F.3d at 1085-86.

[104] *Id*. at 1086.

[105] *Id*.

habitat and population estimates also remained the same.[106] As a result, the Ninth Circuit held that the Board violated NEPA because it relied on stale data and "failed to properly update the data with additional studies and surveys."[107]

D. Consideration and Incorporation of Opposing Scientific Viewpoints

An agency must address in an EIS "responsible opposing view[s]."[108] Courts have interpreted this regulation as requiring agencies to address opposing scientific viewpoints. In recent years, courts have given an agency's response to opposing scientific viewpoints deferential treatment, so long as the agency addressed the opposing statements and differing opinions in a meaningful way during the decision-making process.[109] In *Sierra Forest Legacy v. Sherman*,[110] plaintiffs maintained that the Forest Service failed to address expert views opposing intensified management in an EIS prepared for the 2004 Sierra Nevada Forest Plan Amendment. The Ninth Circuit upheld the Forest Service's response to opposing scientific viewpoints based on its dedication of 120 pages to address "a substantial number of critiques" regarding its consideration of the California spotted owl, long-term modeling efforts, fisher and marten populations, meadow species, and fire ecology.[111] While the court centered its analysis on expert critiques, it also rejected the plaintiffs' suggestion that the Forest Service elevate expert comments over concerns raised by the general public.[112] Specifically, "NEPA does not require that a final [EIS] prioritize the concern of scientific experts" because "practical concerns of individual landholders or hikers may be just as important—and just as trenchant—as the formal submissions of academic experts."[113]

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[106] *Id*.

[107] *Id*. at 1087.

[108] 40 C.F.R. § 1502.9(b).

[109] *See, e.g.*, Ground Zero Ctr. for Non-Violent Action v. Dep't of Navy, 860 F.3d 1244, 1253-55 (9th Cir. 2017) (evidence of meetings and other written documentation demonstrated that the Department of the Navy adequately considered the Safety Board's concerns related to explosives risks for construction of submarine wharf); League of Wilderness Defenders Blue Mountains Biodiversity Project v. Allen, 615 F.3d 1122, 1137 (9th Cir. 2010) (the Forest Service adequately addressed opposing viewpoints by acknowledging and directly responding to the concerns raised by environmental groups); Earth Island Inst. v. Carlton, 626 F.3d 462, 473 (9th Cir. 2010) (holding that the Forest Service did not violate NEPA because it "responded in detail to the specific comments raised by Earth Island"); In re Big Thorne Project, 93 F.Supp.3d 1134, 1147 (D. Alaska 2015) (the Forest Service complied with Section 1502.9(b) by addressing expert critiques in its decision-making process and deferring implementation of timber project to evaluate criticisms raised after the Forest Service completed the NEPA process), *aff'd on other grounds*, 691 F. App'x 417 (9th Cir. 2017); Oceana, Inc. v. Nat'l Marine Fisheries Serv., 2017 WL 3722843, at *2 (9th Cir. Aug. 29, 2017) (the Service adequately responded to opposing views by "adopt[ing] some of the points raised by the critiques, and . . . explain[ing] why a limited, cautious use of the data was warranted").

[110] 646 F.3d 1161 (9th Cir. 2011).

[111] *Id*. at 1182-83.

[112] *Id*. at 1183.

[113] *Id*.

On the other hand, courts will overturn an agency action if the agency has failed to respond to opposing scientific viewpoints "objectively and in good faith."[114] For instance, in *Idaho Conservation League v. Guzman*,[115] the court scrutinized the Forest Service's failure to respond to the plaintiffs' site-specific comments on a travel plan for the Salmon-Challis National Forest. In particular, the court noted that the plaintiffs had submitted over a thousand pages of material for the Forest Service's consideration, but that there was "no indication in the Administrative Record that Defendants considered Plaintiffs' site-specific concerns and supporting photographic evidence."[116]

Over the last several years, courts have continued to decline to extend an agency's obligation to address dissenting scientific viewpoints to EAs.[117] For example, in *Earth Island Institute v. United States Forest Service*,[118] the Ninth Circuit rejected the suggestion that the Forest Service failed to respond to opposing viewpoints concerning the distribution of black-backed woodpecker populations in preparing an EA because "the regulation by its own terms only applies . . . to final environmental impact statements."[119] Nevertheless, the court held that the Forest Service adequately responded to opposing viewpoints because even "[t]hough the Forest Service did not perform the point-by-point type of counter-argument to experts that Plaintiffs appear to desire, our precedent makes clear that an agency 'need not respond to every single scientific study or comment.' "[120] The court also left open the possibility that the requirement to address opposing scientific viewpoints could apply based on a finding that "the agency's EA was the functional equivalent of an EIS."[121]

E. Modeling and Methodologies

The CEQ regulations provide that an EIS must identify methodologies used, along with the scientific and other sources relied on for conclusions in an EIS.[122] These regulations also require federal agencies to "insure the professional integrity, including scientific integrity, of the

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[114] *W. Watersheds Project*, 632 F.3d at 492-93 (BLM violated NEPA by giving "short shrift to a deluge of concerns from its own experts" and other federal and state agencies).

[115] 766 F.Supp.2d 1056, 1076 (D. Idaho 2011).

[116] *Id*.

[117] N. Slope Borough v. Minerals Mgmt. Serv., 343 F. App'x 272, 275 (9th Cir. 2009).

[118] 697 F.3d at 1020.

[119] *Id*. (internal quotation and citation omitted). *See also* Greenpeace, Inc. v. Cole, 445 F. App'x 925, 928 n.4 (9th Cir. 2011) (holding that because the Forest Service "completed EAs—and not EISs—for the Overlook and Soda Nick projects, [the agency] is not under an obligation to comply with § 1502.9(b) and § 1503.4 for those projects"); Ctr. for Biological Diversity v. U.S. Forest Serv., 2013 WL 231112, at *10 (D. Ariz. Jan. 22, 2013) (noting the Ninth Circuit's decision not to extend compliance with Section 1502.9 to EAs).

[120] *Earth Island Inst.*, 697 F.3d at 1021 (quoting Ecology Ctr. v. Castaneda, 574 F.3d 652, 668 (9th Cir. 2009)).

[121] *Id*. at 1020 (citing Save Our Ecosystems v. Clark, 747 F.2d 1240, 1247 (9th Cir. 1984)).

[122] 40 C.F.R. § 1502.24.

discussions and analyses" in an EIS.[123] In recent years, courts have embraced the traditional deference afforded to an agency's modeling and methodology, so long as the agency provides an adequate basis to support its decision making. Despite this high level of agency deference, courts continue to devote substantial time and effort in their opinions to address the adequacy of an agency's modeling or methodology. Even after *McNair*, courts have not hesitated to delve into the technical and scientific details of an agency's chosen model or methodology.[124]

1. Modeling

Courts afford deference to an agency's modeling choices so long as the agency performs "the requisite investigation" in its analysis.[125] For example, in *Greater Yellowstone Coalition v. Lewis*,[126] the plaintiff argued that BLM and the Forest Service failed to conduct additional modeling of future selenium pollution on the grounds that existing modeling did not account for seasonal variations. In upholding BLM's and the Forest Service's modeling efforts, the Ninth Circuit credited the agencies for a "thorough review of extensive modeling studies" and their decision to "ask[] an outside consultant to evaluate [the critic's] concerns."[127] Moreover, even though BLM and the Forest Service required future testing to verify the accuracy of the model's predictions, the court held that future testing "should not . . . be construed as undermining their evaluation of the environmental impacts of the mine expansion."[128]

Similarly, in *Tri-Valley Cares v. Department of Energy*,[129] the Ninth Circuit considered a challenge to the Department of Energy's modeling to simulate the impacts of an intentional terrorist attack on a biosafety facility. Although the court had previously rejected the agency's

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[123] *Id*.

[124] *See, e.g.*, Native Ecosystems Council v. Weldon, 697 F.3d 1043, 1052 (9th Cir. 2012); *see also infra* n.136.

[125] *Greater Yellowstone Coal. v. Lewis*, 628 F.3d 1143, 1150 (9th Cir. 2010); *see also N. Plains Res. Council*, 668 F.3d at 1080 (an agency "is afforded deference in choosing its scientific method for modeling data"); WildEarth Guardians v. Jewell, 738 F.3d 298, 311-12 (D.C. Cir. 2013) (upholding BLM's reliance on nitrogen oxide models as a proxy for ozone, as opposed to separately modeling ozone levels, for federal coal lease in Wyoming because "[t]he NEPA process involves an almost endless series of judgment calls, and the line-drawing decisions necessitated by the NEPA process are vested in the agencies, not the courts" (internal quotation and citation omitted)); San Juan Citizens All. v. Stiles, 654 F.3d 1038, 1056-57 (10th Cir. 2011) (BLM adequately modeled cumulative air quality impacts, even though it declined to model impacts within certain Class I areas in New Mexico); Ctr. for Biological Diversity v. BLM, 2017 WL 3667700, at *8 (D. Nev. Aug. 23, 2017) (in EIS for groundwater development project, BLM was not arbitrary "in limiting its analysis to areas that are likely to experience at least a 10-foot decrease in the groundwater level;" BLM offered reasons for limiting its analysis, and BLM's experts concluded that "a lower limit would make it difficult to determine which impacts were caused by the water drawdown and which were caused by other natural factors. BLM is entitled to deference in determining the appropriate contours of its model.").

[126] 628 F.3d at 1150.

[127] *Id*.

[128] *Id*.

[129] 671 F.3d 1113 (9th Cir. 2012).

failure to consider the potential impacts of an intentional terrorist attack in prior litigation,[130] the Ninth Circuit upheld the Department of Energy's modeling on remand even though it used a catastrophic release model (i.e. an accidental release model) to consider the direct impacts of a terrorist attack.[131] As part of its reasoning, the court cited the agency's "ample justification and evidence for why it used the [catastrophic release] model to assess the impacts of a terrorist attack."[132] And in *Barnes v. Federal Aviation Administration*,[133] the Ninth Circuit similarly upheld the Federal Aviation Administration's analysis of future air traffic growth at the Hillsboro Airport near Portland, Oregon because it conducted an "extensive analysis" in modeling three different air traffic scenarios related to potential increased demand and aircraft operations from the construction of a new runway.

2. Methodologies

While the adequacy of an agency's methodology has become a common feature in many NEPA challenges, courts will generally uphold an agency's selected methodology so long as it engages in a "reasonably thorough discussion" of environmental consequences.[134] This principle is based on the notion that "[i]t is not the role of this court 'to decide whether an [EIS] is based on the best scientific methodology available.'"[135] Citing to *Lands Council v. McNair* in a challenge to an agency's methodology, the Ninth Circuit has reiterated that "an agency must have discretion to rely on the reasonable opinions of its own qualified experts, even if, as an original matter, a court might find contrary views more persuasive."[136] For example, in *Native*

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[130] Tri-Valley Cares v. Dep't of Energy, 203 F. App'x 105, 106 (9th Cir. 2006).

[131] *Tri-Valley Cares*, 671 F.3d at 1125-26.

[132] *Id*. at 1126.

[133] 865 F.3d 1266, 1270-71 (9th Cir. 2017).

[134] *Alaska Survival*, 705 F.3d at 1088; *see also* Desert Prot. Council v. U.S. Dep't of the Interior, 630 F. App'x 705, 707 (9th Cir. 2015) (upholding BLM's methodologies in conducting migration surveys because "the final EIS contains a reasoned analysis of the migration and presence of Swainson's hawks and other raptors at the Project site"); Pryors Coal. v. Weldon, 551 F. App'x 426, 429 (9th Cir. 2014) (accepting BLM's justification for using elk as a surrogate for its analysis of the impacts on mule-deer and white-tailed deer in considering travel management plan).

[135] *Alaska Survival*, 705 F.3d at 1088 (quoting *McNair*, 537 F.3d at 1003); *see also* Oceana v. Bureau of Ocean Energy Mgmt., 37 F.Supp.3d 147, 169 (D.D.C. 2014) (reiterating the D.C. Circuit's view that Section 1502.24 "does not require that an agency employ the best, most cutting-edge methodologies" (quoting Theodore Roosevelt Conservation P'ship v. Salazar, 616 F.3d 497, 511 (D.C. Cir. 2010)).

[136] *Native Ecosystems Council*, 697 F.3d at 1051 (quoting *McNair*, 537 F.3d at 1000); *see also* Idaho Wool Growers Ass'n v. Vilsack, 816 F.3d 1095, 1108 (9th Cir. 2016) (upholding the Forest Service's modeling of bighorn sheep home ranges and movements in considering impacts of domestic grazing on bighorn sheep because the "Forest Service is owed greater-than-average deference as it relates to its choice of technical methodologies"); Ctr. for Biological Diversity, 2017 WL 3667700, at *7-8 (citing *Lands Council v. McNair*, holding that BLM's methodology limiting its analysis to greater than 10-foot drawdowns in model for groundwater development project because "BLM offers reasons for limiting its analysis to these areas, including the large scale of the model and the natural fluctuations of groundwater"); Bark v. Northrop, 2016 WL 1181672, at *12 (D. Or. Mar. 25, 2016) (rejecting plaintiffs'

Ecosystems Council v. Weldon,[137] the plaintiff argued that the Forest Service's use of an aerial photo interpretation methodology to evaluate elk hiding cover for a fuels reduction project was "invalid and unreliable" because the methodology did not adequately disclose stand density. After engaging in a detailed analysis of the Forest Service's selected methodology, including its reliance on an elk logging study from 1982, the Ninth Circuit upheld the Forest Service's analysis as adequate because the plaintiffs could not demonstrate that the selected methodology was inappropriate under the particular circumstances of the case and in light of the substantial deference owed to the Forest Service.[138]

In another instance, the Eleventh Circuit rejected a claim that the Bureau of Ocean Energy Management failed to comply with NEPA when it declined to use a mechanical risk index—"a methodology that evaluates risk factors for deepwater wells"—to evaluate the risk of an oil spill from an exploratory offshore drilling plan.[139] Given that the plaintiffs failed to produce any evidence that the mechanical risk index methodology was standard in the industry for assessing spill risks, the court declined to substitute its judgment for that of the agency.[140] Similarly, in *Biodiversity Conservation Alliance v. U.S. Forest Service*,[141] the plaintiff claimed that the Forest Service violated NEPA by failing to conduct site-specific visits and full botanical surveys to assess impacts related to motorcycle use on a five-mile trail within the Middle Fork Inventoried Roadless Area. The Tenth Circuit rejected the plaintiff's argument and held that the Forest Service's use of remote sensing, satellite imagery, and information obtained by wildlife biologists was reasonable.[142] In particular, the Forest Service's methodology was upheld as appropriate because "NEPA does not require the agency to use particular methodologies."[143] Rather, courts "look to whether the agency's chosen method is sound, not whether there are

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challenge to the Forest Service's sediment yield methodology based on the notion that "an agency's choice of methodology is wholly within its discretion and should not be disturbed on judicial review").

[137] 697 F.3d at 1052.

[138] *Id*. at 1051-53.

[139] Defenders of Wildlife v. Bureau of Ocean Energy Mgmt., 684 F.3d 1242, 1250 (11th Cir. 2012).

[140] *Id*. (recognizing that courts "must be extremely deferential when an agency's decision rests on the evaluation of complex scientific data within the agency's technical expertise" (internal quotation and citation omitted)); *see also* Greer Coal. Inc. v. U.S. Forest Serv., 470 F. App'x 630, 634 (9th Cir. 2012) (when plaintiffs failed to demonstrate that the Forest Service's choice of hydraulic conductivity testing was unreasonable, the "court must decline [the] invitation to resolve disagreements among various scientists as to methodology" (internal quotation and citation omitted)).

[141] 765 F.3d 1264, 1270 (10th Cir. 2014).

[142] *Id*.

[143] *Id*.; *see also* Prairie Band Pottawatomie Nation v. Fed. Hwy. Admin., 684 F.3d 1002, 1013-14 (10th Cir. 2012) (the Federal Highway Administration had a rational basis for its decision to use the number of accidents per year to evaluate project safety, while using the number of accidents per million vehicle miles to evaluate the project's purpose and need).

competing methods that might work as well."[144] Nevertheless, an agency violates NEPA if it fails to discuss relevant shortcomings regarding its selected methodology in its analysis.[145]

Finally, numerous courts have been faced with addressing the adequacy of an agency's methodology with respect to climate change and greenhouse gas emissions. Given the global nature of climate change, along with various scientific uncertainties, it has been difficult for agencies to accurately predict how any particular proposed action may affect, and be affected by, climate change and greenhouse gas emissions on both a local and global scale. In recent years, courts have provided some guidance to federal agencies regarding appropriate methodologies for addressing climate change. For example, in *WildEarth Guardians v. Jewell*,[146] plaintiffs challenged BLM's approval of a federal coal lease in Wyoming based on its alleged failure to consider the leasing decision's impacts on global climate change. In conducting its analysis, BLM discussed the prevailing scientific consensus on global climate change and, in turn, quantified the projected greenhouse gas emissions from BLM's leasing decision and compared them to state-wide and nation-wide emissions inventories.[147] The D.C. Circuit upheld BLM's climate change analysis as adequate and further held that "[b]ecause current science does not allow for the specificity demanded by the [plaintiffs], the BLM was not required to identify specific effects on the climate in order to prepare an adequate EIS."[148] In another example, the Sixth Circuit upheld the Federal Highway Administration's decision not to conduct a detailed analysis of greenhouse gas emissions for a construction and transportation management program.[149] The court's decision was based on its conclusion that the agency "cannot usefully evaluate greenhouse gas emissions on a Project-specific basis because of the non-localized, global nature of potential climate impacts."[150] Instead, the Sixth Circuit held that it was sufficient for the Federal Highway Administration to acknowledge that greenhouse gases from

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[144] *Biodiversity Conservation All.*, 765 F.3d at 1270.

[145] *See, e.g.*, Valley Cty. Idaho v. U.S. Dep't of Agric., 998 F.Supp.2d 919, 922-27 (D. Idaho 2014) (where the Department of Agriculture lacked sufficient funding and personnel to conduct its own study of unauthorized roads, it violated NEPA by failing to disclose the proxy methodology used in its analysis); *see also Native Village*, 740 F.3d at 502 (rejecting the Bureau of Ocean Energy Management's one billion barrel estimate for oil production under an offshore oil and gas lease sale based upon its failure to provide an adequate explanation in the record).

[146] 738 F.3d at 308-09.

[147] *Id*. at 309.

[148] *Id*.; *see also* Barnes v. Dep't of Transp., 655 F.3d 1124, 1139 (9th Cir. 2011) (since "the effect of greenhouse gases on climate is a *global* problem; a discussion in terms of percentages is therefore adequate for greenhouse gas effects"); Prot. Our Cmtys. Found. v. Jewell, 825 F.3d 571, 584-85 (9th Cir. 2016) ("BLM was entitled to choose among various reasonable methodologies, as it did here, when estimating [greenhouse gas] emissions generated by the Project"); WildEarth Guardians v. BLM, 8 F.Supp.3d 17, 35 (D.D.C. 2014) ("because current climate science is uncertain (and does not allow for specific linkage between particular [greenhouse gas emissions] and particular climate impacts) . . . evaluating [greenhouse gas] emissions as a percentage of state-wide and nation-wide emissions, as BLM did here, is a permissible and adequate approach").

[149] Coal. for Advancement of Reg'l Transp. v. Fed. Hwy. Admin., 576 F. App'x 477, 491 (6th Cir. 2014).

[150] *Id*.

vehicles contribute to climate change and disclose its reasons for declining to perform a more detailed analysis.[151] Finally, courts have recently addressed the circumstances in which an agency has failed to adequately address climate change impacts in its NEPA analysis.[152]

V. What Factors Underlie the Harder Look?

The federal courts have long signaled a willingness to inquire into—and set aside as inadequate under NEPA—the assumptions, methodologies, and data used by federal agencies in NEPA documents.[153] The development of the harder-look review is consistent with the longstanding duality of process/substance review of agency decision making.[154] "[P]rocess values still undergird and inform substantive 'hard look' review in important and varied ways, to a degree that federal courts generally have failed to acknowledge or explain. . . . An agency that ignores process values invites presumably unwanted judicial scrutiny."[155] Moreover, the "difficulties of asking generalist judges to review difficult scientific, mathematical, or technical materials are real ones that deserve continuing attention."[156]

In documenting the continuation of harder-look review in NEPA cases—even since *McNair*—it appears that the bases underlying its application remain similar to those we previously identified. Part of the shift toward harder-look review may be due to the positive feedback loop engendered by the courts' earlier decisions. For instance, in *Neighbors of Cuddy Mountain* and *Idaho Sporting Congress*, and in a trend that continues in the contemporary cases reviewed here, the courts required agencies to provide detailed and quantified information and the underlying data on which the agency's EIS conclusions were based. As a result of these and other decisions, agencies are required to provide more detailed information supporting the assessment of potential environmental effects, and provide up-front disclosures of the limitations and assumptions underlying their modeling and computational efforts. Making this information available in the administrative record for the agency's NEPA decision and allowing for public and expert agency review of these materials during the NEPA process can produce a more

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[151] *Id*.

[152] *See, e.g., Sierra Club v. FERC*, 867 F.3d 1357, 1374 (D.C. Cir. 2017) (rejecting NEPA analysis for interstate natural gas pipelines because the Federal Energy Regulatory Commission "should have either given a quantitative estimate of the downstream greenhouse emissions that will result from burning the natural gas that the pipelines will transport or explained more specifically why it could not have done so"); *see also WildEarth Guardians*, 870 F.3d at 1234-38.

[153] *See, e.g., California v. Block*, 690 F.2d 753, 763-65 (9th Cir. 1982); *Louisiana Wildlife Fed'n v. York*, 761 F.2d, 1052-54 (5th Cir. 1985); *see also Ctr. for Biological Diversity v. U.S. Forest Serv.*, 349 F.3d 1157, 1169 (9th Cir. 2003) (citing *Block*, 690 F.2d at 769*); NRDC v. U.S. Forest Serv.*, 421 F.3d 797, 814 (9th Cir. 2005) (same).

[154] *See* Ronald J. Krotoszynski, Jr., " 'History Belongs to the Winners': The Bazelon-Leventhal Debate and the Continuing Relevance of the Process/Substance Dichotomy in Judicial Review of Agency Action," 58 *Admin. L. Rev.* 995, 998 (2006).

[155] *Id.*

[156] *Id*. at 1015; *see also* Andrew C. Mergen, "An Environmental Court for Hawaii—Will Other States Follow?" 47(3) *Trends (A.B.A. Sec. Env't, Energy and Resources)* 4 (Jan./Feb. 2016) (addressing history of environmental court proposals at state and federal levels in the United States).

thorough and informed set of EIS comments that in turn must be considered and addressed in the final NEPA document. Thus, the requirements for information and data disclosure have made more information and technical data available to NEPA document reviewers and commenters, enabling them to provide more sophisticated comments that, while based on NEPA's procedural requirements, may also implicate the substance of the agency's determinations and use of scientific and technical information.

Also, as experienced practitioners know, the caselaw is fragmented with highly fact-driven and program- and site-specific decisions.[157] It can be difficult to reconcile all of the federal court NEPA decisions on any given topic. To this mélange, the fact that science itself is not static, but instead continues to evolve as new theories and methodologies are tested and adopted and older ones discarded,[158] seems inevitably to suggest that the actions necessary to comply with NEPA's directives concerning the use of science to forecast likely environmental impacts also are not static but will likewise continue to evolve.

Some of that evolution is reflected in our survey of the more recent caselaw here. There is a growing categorization or speciation of NEPA review cases, further refining the bases on which a particular case may receive harder-look or more deferential review. For example, in *Oceana, Inc. v. National Marine Fisheries Service*, the Ninth Circuit distinguished cases where an agency failed to mention a "significant [scientific] disagreement with the agency's key conclusion" from those instances where an agency simply may not have disclosed "some uncertainty" about the model it used.[159] The former example being reversible error, the latter not. But the fact-specific nature of the caselaw, together with the development of harder-look review, is driving yet further fragmentation of that caselaw as the courts ascertain in any particular instance whether to apply harder-look review. In *Natural Resources Defense Council, Inc. v. Pritzker*, for instance, the court characterized the agency's decision not to use the precautionary principle as "a policy choice" and "not a scientific determination."[160] The court then overturned the agency's policy choice as inconsistent with the substantive statute at issue, while at the same time implying that if it had been a "scientific determination," then the court may have deferred to the agency.[161]

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[157] *See* Carla Mattix & Kathleen Becker, "Scientific Uncertainty Under the National Environmental Policy Act," 54 *Admin. L. Rev.* 1125, 1155 (2002) ("it is clear that agencies have little, and varied, guidance from the courts when dealing with scientific uncertainty" under NEPA).

[158] *Id*. at 1141 ("[s]cience almost never provides final answers" but is a tool for reasoned decision making about possible environmental consequences); Michael J. Brennan et al., "Square Pegs and Round Holes: Application of the 'Best Scientific Data Available Standard in the Endangered Species Act,' " 16 *Tulane Envtl. L. J.* 387, 393 (2003) ("A prevailing [scientific] paradigm extends over time, informing and being informed by the experiments in which it is involved and by new knowledge learned. Sometimes the paradigm grows and flourishes and sometimes it is replaced by something revolutionary.") (citing Thomas Kuhn, The Structure of Scientific Revolutions (3d ed. 1996)).

[159] 2017 WL 3722843, at *2 (9th Cir. Aug. 29, 2017).

[160] 828 F.3d 1125, 1139-40 (9th Cir. 2016).

[161] *Id*. at 1140-42; *see also Oceana*, 2017 WL 3722843, at *2 n.2 (discussing same).

As the frontiers of science advance, the judiciary's need to balance its role as reviewer of agency action in the face of ever-more complex scientific analyses will only continue. The intersection between the evolution in scientific knowledge and tools on the one hand, and the courts' struggles to discharge their responsibilities in reviewing the actions of agencies with greater technical expertise and data analysis resources than those available to judges and legal practitioners on the other, will continue to pose both a challenge to the authors of NEPA documents and fruitful ground for NEPA litigants.

VI. Conclusions and Recommendations

Litigation arguments regarding—or even conclusory judicial statements about—"deference" to an agency's NEPA decision making on scientific or technical issues oversimplify the complex balancing and inquiries which courts are directed to undertake in reviewing both the process and substantive issues inherent in evaluating agency use of scientific and technical information under NEPA. A reviewing court at best must struggle to comprehend the agencies' assessments and conclusions regarding environmental effects and to judge their compliance with NEPA in light of the rule of reason, hard look, and arbitrary or capricious formulations of the standard of review.

Where agency NEPA documents are inartfully drawn, incomplete, or otherwise lacking in clarity and comprehensibility, a reviewing court may have little choice but to delve more deeply into the substantive subject matter underlying agency conclusions in an attempt to discern whether, or to what degree, the agency has failed to meet those standards. At the least, less clearly drafted and supported NEPA documents will offer an invitation to conscientious judges to venture into the realm of agency expertise in an effort diligently to review agency action and ensure the agency's implementation of NEPA's twin goals of informed decision making and informed public disclosure.

As the law of NEPA continues to evolve, and agency reliance upon more complex and technical scientific methodologies and information in natural resource management and decision making continues to grow, federal agencies, NEPA practitioners, and stakeholders must recognize and adapt to the shifting standards for scientific information and analysis under NEPA. In particular, those charged with the development and use of NEPA documents need to ensure that the use of scientific information and analyses in NEPA documentation is clear, transparent, and understandable to both the lay public and the lay judiciary. Accomplishing this requires careful attention to:

(1) using the most up-to-date information available;

(2) identifying limitations in models, methodologies, and information and disclosing them in the NEPA document;

(3) where multiple and conflicting data sets, models, or other methodologies for impact assessment exist, comparing and contrasting their strengths and weaknesses, and explaining in the NEPA document the basis for selecting one data set or methodology over another, or for considering multiple methods and data sets in the analysis;

(4) documenting the source and basis for key assumptions, standards, and data used in the NEPA document;

(5) erring on the side of transparency and, in the language of one early NEPA case, ensuring that stubborn problems are not "otherwise swept . . . under the rug";[162]

(6) considering and addressing responsible opposing scientific views; and

(7) where data gaps exist, either filling the gaps or explaining why doing so would be too costly or infeasible.

These and related efforts will produce improved environmental analyses and NEPA documents, and ultimately better agency decisions, thus meeting the underlying goals of the NEPA process. Greater awareness of the types of impact assessment and scientific issues being encountered by the agencies and reviewed by the courts can guide NEPA practitioners, agencies, and stakeholders in meeting NEPA's requirements for high-quality information and accurate scientific analysis.

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[162] County of Suffolk v. Sec'y of Interior, 562 F.2d 1368, 1384-85 (2d Cir. 1977).