METHODS AND DETERMINATIONS OF ENVIRONMENTAL JUSTICE ANALYSES IN NEPA ASSESSMENTS, 2016-2021

by

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LAND ACKNOWLEDGEMENT

We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O'odham and the Yaqui. Committed to diversity and inclusion, the University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities through education offerings, partnerships, and community service.

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Abstract

Since 1994, Federal agencies have been responsible for identifying and addressing disproportionately high and adverse impacts on environmental justice (EJ) populations, including minority and low-income populations. EPA defines environmental justice as the "fair treatment and meaningful involvement of all people regardless of race, color, national origin or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies." The environmental assessment process of the National Environmental Policy Act (NEPA) has been a primary regulatory process through which EJ analyses have been performed. We evaluated NEPA EJ analyses from a random sample of 100 Final Environmental Impact Statements (FEISs) completed between 2016 and 2021 to determine the specific methods and determinations of the analyses. We developed a coding rubric and classified documents according to metrics evaluating the EJ methods and determinations. We detected no consistent method used to identify EJ populations, with 28 different minority threshold combinations and 30 different low-income threshold combinations described. Twenty-seven FEISs did not conduct an EJ demographic analysis and thirty-four FEISs provided a page or less of EJ-related text. The results of this study show a need for defined EJ methods and improved regulatory guidance. Agencies may find the results of this study practically helpful when developing overall EJ guidance, and information regarding the demographic analysis process and specific mitigation measures may be helpful to EIS preparers at the project-level.

Introduction

The National Environmental Policy Act of 1969 (NEPA) is the principal planning and review process for environmental and social impacts of major federal actions. NEPA requires agencies to evaluate the impacts and alternatives of proposed projects that have a federal nexus and that may cause significant environmental impacts (US Congress, 1969).

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" directs agencies to "[identify and address] disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations" (E.O. 12898, 1994). The accompanying memorandum stated that agencies should evaluate environmental justice (EJ) in their NEPA analyses (Clinton, 1994). Since E.O. 12898 was signed in 1994, there have been few studies that have evaluated EJ analyses in NEPA environmental assessments. The purpose of this paper is to describe the methods and determinations of EJ analyses in EISs completed between 2016 and 2021.

What concerns does environmental justice seek to address? Since the 1970s there have been reports that minority and low-income communities have a disproportionately high likelihood of exposure to harmful environmental conditions (Mikati *et al*., 2017; Houston *et al*., 2004; Cushing *et al*., 2015). Emission and population data from all 50 states and Washington, DC, found that minority individuals had a 1.28 times higher burden from particulate matter emissions when compared to whiter and wealthier communities, and people in poverty had a 1.35 times higher burden (Mikati *et al*., 2017). Similarly, in southern California, children from minority and low-income households are disproportionately located near high traffic areas, and low-income and minority neighborhoods are exposed to two times more traffic density than other

neighborhoods, increasing their risk of exposure to vehicle-related pollutants (Houston *et al.,* 2004). An analysis of pollution burden along with population vulnerability showed communities of color are disproportionately affected by pollution from pesticides, hazardous waste, and diesel particulate matter (Cushing *et al*., 2015).

How can NEPA address environmental justice concerns? NEPA has been one of the federal government's main vehicles for evaluating EJ impacts and concerns. Within the NEPA framework, federal actions that are likely to have a significant impact on the human environment must complete an EIS to evaluate the potential environmental and social impacts of the proposed action and to identify and evaluate alternatives to the proposed action (US Congress, 1969). Within the EIS process, NEPA requires the solicitation of public comments and a corresponding response for all substantive comments. In this way, NEPA not only requires agencies to evaluate the impacts and alternatives, but also to address substantive concerns of the public during the process. Although NEPA does not limit the final decision-making capacity of agencies, E.O. 12898's accompanying memorandum states that "mitigation measures outlined or analyzed in an environmental assessment, environmental impact statement, or record of decision, whenever feasible, should address significant and adverse environmental effects of proposed Federal actions on minority communities and low-income communities" (Clinton, 1994).

How are agencies told to evaluate environmental justice? In 1997 the Council on Environmental Quality (CEQ) published "Environmental Justice: Guidance Under the National Environmental Policy Act" (CEQ, 1997). The guidance provided agencies general principles and strategies on how to identify and address disproportionate impacts to minority and low-income populations, including the need to consider the demographics of the affected area, cumulative and multiple-exposure impacts, relevant public health or industry data, as well as the importance

of meaningful public involvement in the process. CEQ's 1997 guidance also included guidance by the Interagency Working Group on Environmental Justice ("Interagency Working Group"), which provides definitions and general methods on how to identify minority and low-income populations. However, CEQ states that "agencies should apply the [Interagency Working Group] guidance with flexibility, and may consider its terms a point of departure rather than conclusive direction" (CEQ, 1997). CEQ guidance does not require any specific EJ outcome, but recommends a specific process where "appropriate" and "practicable" (CEQ, 1997). In summary, although CEQ and the Interagency Working Group guidance provides recommendations, they are not prescriptive in nature, and do not impart legal obligations on agencies regarding EJ reviews (CEQ, 1997).

EJ guidance is generally broad, covering a wide array of issues relevant to public outreach, identifying EJ populations, incorporating data, identifying adverse impacts, and developing mitigation. The following paragraphs describe the demographic analysis process recommended by CEQ and EPA to better understand the variables included in this study.

The Interagency Working Group/CEQ guidance (1997) states that "minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis" and that "low-income populations…should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty," with no further detail provided.

In 2016 EPA released guidance titled *Promising Practices for EJ Methodologies in NEPA Reviews* which describes a more specific process to identify EJ populations. To identify minority

populations, EPA's *Promising Practices* guidance describes a "No-threshold analysis" in which any affected minority population is considered an EJ population, or a combination of a "Fifty Percent" and a "Meaningfully Greater" analysis, in which a minority population over 50% or a minority population which is "meaningfully greater" than a geographical reference unit is considered an EJ population. EPA directs agencies to use data from local geographic units of scale (e.g., census block, block group) to identify the affected population, and a reference unit (e.g., county, state, region) when comparing demographics to the broader population. EPA gives agencies the discretion to choose what specific methods to follow.

To identify low-income populations, EPA's *Promising Practices* guidance describes an "Alternative Criteria analysis" in which agencies define a threshold to identify EJ populations, or a "Low-Income Threshold Criteria analysis" in which a low-income population which is "meaningfully greater" than a reference unit is considered an EJ population (EPA, 2016). The guidance does not recommend a specific measurement of poverty (e.g., below the poverty level, median household income, etc.).

What does this study evaluate? While academic studies have evaluated the correlation between environmental hazards and low-income and/or minority populations, there are few studies that have evaluated EJ in the NEPA process. Studies that address EJ and NEPA tend to focus on a particular agency (Pinney 2003) or a specific case study (Atencio *et al*., 2022) with large-n studies being scarce, likely due to a lack of accessibility of NEPA documents and the tendency of NEPA assessments to be hundreds to thousands of pages long. Prior to this study, there has been one comprehensive evaluation of EJ assessments in NEPA, which evaluated 46 EISs from the state of Arizona that were published between 2012 and 2021 (Becker-Turk *et al.,* 2023).

To describe the methods and overall determinations and outcomes of EJ assessments in EISs, we posed two general questions: 1) What were the outcomes and determinations of EJ analyses? and 2) What methods were used in EJ analyses? To answer each question, data was collected on various metrics. Metrics were developed through an iterative process of reviewing federal guidance as well as individual EISs to develop a coding rubric. We collected a random sample of 100 Final Environmental Impact Statements (FEISs) completed between 2016 and 2021, and read and evaluated the EJ text for the defined variables. The results of this study are provided to better understand the characteristics of EJ analyses in NEPA assessments.

Methods

This study included a review of Executive Orders, CEQ, Interagency Working Group, and EPA EJ guidance and the coding of 100 randomly sampled FEISs published between 2016 and 2022. The coding of FEISs was iterative in nature, with EJ variables added and refined as they appeared in EISs under review. EISs were reviewed for information multiple times as variables were added. We identified and coded for 20 variables included in this study.

This study found that EJ analyses could be described by two main sections: the demographic analysis and the impact assessment. To answer the question "What were the outcomes and determinations of EJ analyses?" we collected data to describe the outcomes/determinations of both the EJ demographic analysis and the EJ impact assessment. Variables for the outcomes/determinations of the demographic analysis include whether a demographic analysis was performed, whether a minority population was identified, and whether a low-income population was identified. Variables for the determinations and outcomes of the

impact analysis include the disproportionate adverse impact determination, the overall impact analysis conclusions, and the types of EJ mitigation employed.

To answer the question "What methods were used in EJ analyses?" we collected data to describe the methods of EJ demographic analyses and impact assessments. Variables for the demographic analysis methods include the demographic unit of analysis used, demographic reference unit used, demographic data variables provided, year of sourced demographic data, low-income threshold(s) used, minority threshold(s) used, other threshold(s) used, and whether EJ mapping tools were used. Variables for the impact assessment methods include whether there was an EJ comparison between alternatives, an EJ cumulative impacts assessment, and/or a map of EJ populations and impacts. To further describe the sample, we coded for federal department, action type and length of EJ text.

Sampling and coding methods

All EIS records were exported from the EPA EIS database (https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/search) and sorted to only include FEISs published between January 1, 2016 and December 31, 2021 (EPA, 2023a). The EPA dataset includes the fields of EIS title, document type (Draft, Final, etc.), Federal Register date, agency, and state (EPA, 2023a). We refined the sorted FEISs to exclude "Adoption" FEISs, which are identical FEISs published by cooperating agencies, or "Supplemental" FEISs, which are document revisions/additions to previously completed FEISs. We identified 686 FEISs as being published during the time period, and randomly sampled 100 from this list for further analysis. The sample contains 14.6% of all FEISs identified during the 5-year period.

PDF documents were downloaded from the EPA EIS database and the University of Arizona's NEPAccess database, through which all FEIS files in the sample were available (EPA, 2023a; University of Arizona, 2023). To facilitate document analysis, all PDF files associated with each EIS (including appendices) were combined into a single sequential PDF. The Adobe Acrobat search function was used to identify any references to EJ. The keyword "justice" was used to identify EJ text in FEISs (Becker-Turk et al., 2023). Some FEISs only presented changes to the associated Draft Environmental Impact Statement (DEIS), or referenced an associated FEIS or Environmental Assessment (EA). In those cases, the DEIS, FEIS, and/or EA was also reviewed for EJ information. Documents were coded according to a rubric. Text associated with the variables was copied to facilitate further data review.

To determine length of text associated with EJ analyses, all EJ text was copied into separate Word documents using Adobe Acrobat Pro. Text was reviewed and corrected of errors (erroneous characters that occurs sometimes when copying PDFs) and a word count was determined. Using the ratio of 500 words/page (Dexter, 2022), a page count was determined for each FEIS. Exact duplications of paragraphs of text were removed to determine the word count of unique text. Additionally, text associated with captions relevant to EJ was included.

As the topic of EJ often overlaps with discussions of socioeconomics, Tribal consultation, and public outreach, only text that discussed EJ specifically was evaluated, regardless of where it fell in the FEIS. Although the entirety of the topic of socioeconomics is arguably relevant to EJ, socioeconomic profiles in EISs often focus on the economic impacts of a project with financial analyses of regional impacts. Tribes are included in this study when part of EJ methods, however tribal consultation is not included in this study as it is mandated by other federal regulations. Regarding public outreach and meetings, NEPA requires agencies to solicit public input

regardless of other considerations, and typically includes outreach/meetings as a separate topic in EISs.

Over the course of this study, FEISs (and referenced DEISs and EAs, as necessary) were keyword-searched and EJ text was read multiple times in its entirety to confirm all relevant text in the documents had been identified and data had been accurately collected. The lead author performed all EIS data entry and data analysis over the course of this study.

Results

Sample composition

The 100 randomly sampled FEISs published from 2016-2021 consist of FEISs from 28 different federal, state, and local agencies. The relative representation of agencies in the sample closely matched that of all FEISs during the 5-year period with the percent of FEISs produced by agency differing an average of 0.9 % from the actual agency makeup during the time period, with a maximum difference of 3.8% (Army Corps of Engineers was 3.8% overrepresented in the sample) (Table 4, Appendix A). The associated departments represented in the sample included eight federal departments, three independent federal agencies, one state agency, and one local agency (Table 5, Appendix A)

EJ word/page count

On average, EISs provided 5.8 pages of EJ-related text (2925 words) with a median of 3.0 pages. Four FEISs provided no EJ information at all, 30 FEISs provided > 0 and ≤ 1 page,

and one FEIS provided 56.0 pages of EJ-related text. Figure 1 provides a histogram of EJ text length.

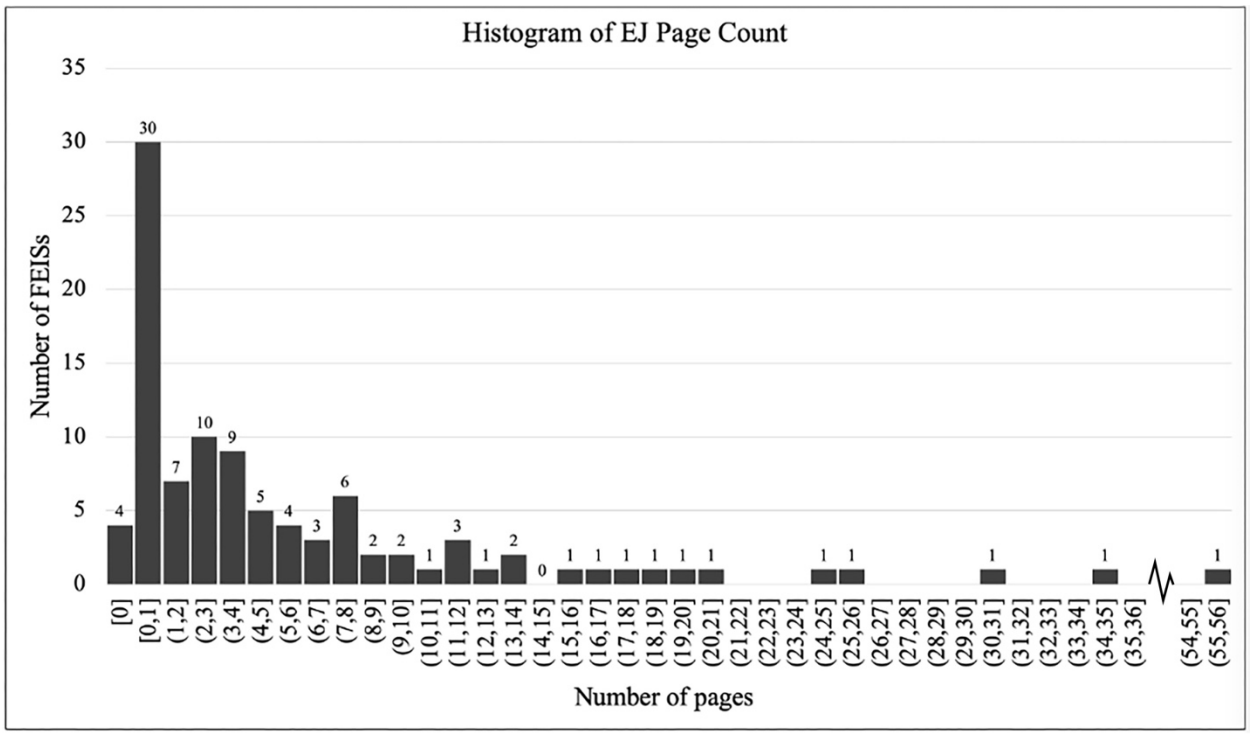

Figure 1. Histogram of EJ page count of FEISs in sample. There is an axis break on the x-axis from 36 to 54 pages. On average, EJ analyses provided 5.8 pages of EJ text with a median of 3.0 pages (500 words per page). Four FEISs wrote zero pages of EJ-related text and one FEIS provided 56.0 pages of EJ-related text

Outcomes and determinations of EJ analyses

Flow diagram

The overall outcomes and determinations are provided in a flow diagram below (Figure 2). In evaluating whether FEISs included an EJ demographic analysis, any description of the demographics of minority and/or low-income populations was considered an EJ demographic analysis. Overall, 73 of the FEISs conducted an EJ demographic analysis (of any scope) and 27 of FEISs did not. Of the 28 FEISs that did not conduct an EJ demographic analysis, 11 FEISs

made a "no adverse impact" determination without a demographic analysis, 9 FEISs stated that EJ was dismissed from their analysis, 3 FEISs did not mention EJ at all, 2 FEISs referred to results of a prior EIS process (without providing the results), and 2 FEISs stated that EJ analyses would occur during site-specific planning (Figure 2). It is worth noting that FEISs that explicitly dismissed EJ from their analysis are similar to FEISs that made a "no adverse impact" determination without a demographic analysis, with different language being used in the determination.

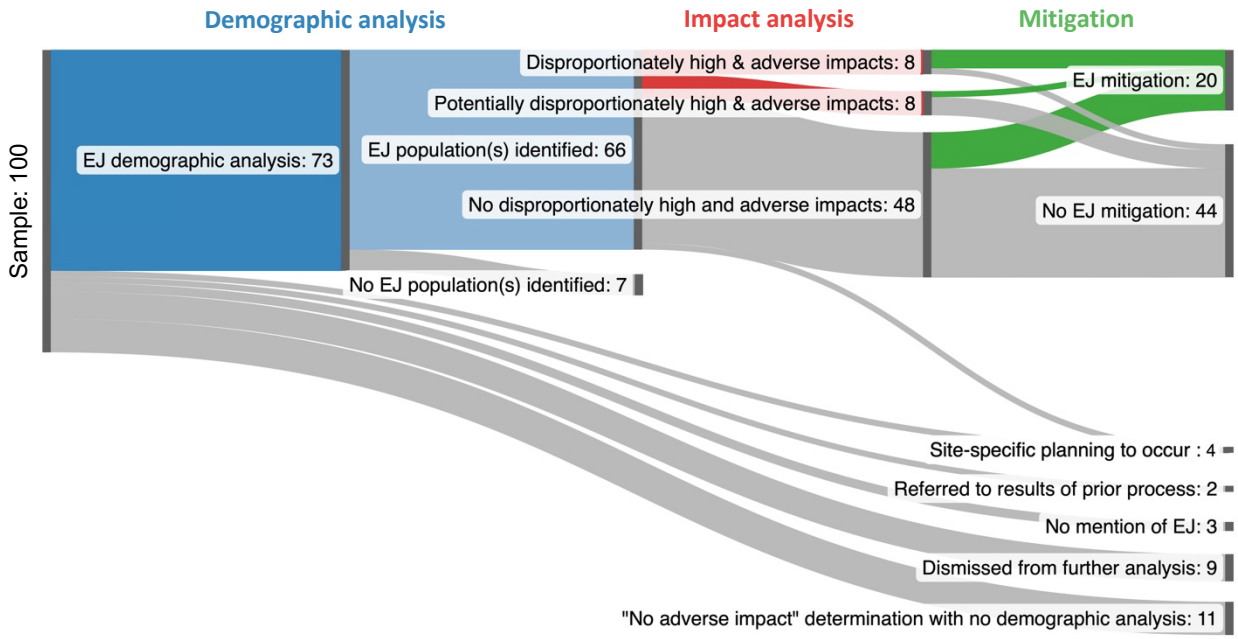

Figure 2. Sankey diagram representing the overall outcomes of EJ analyses within the sample. Flow and node widths are scaled proportionally. Numbers represent the count/percent of FEISs in the sample that met each criteria.

To better understand why EJ demographic analyses were not included in the 28 FEISs, those FEISs are here described with some additional detail. Evaluated by agency, FEISs that did not conduct an EJ demographic analysis included FEISs by the Forest Service (10/20 FEISs in

sample), National Park Service (5/5), Bureau of Land Management (4/12), National Oceanic and Atmospheric Administration (2/3), U.S. Coast Guard (1/1), U.S. Army (1/1), U.S. Navy (1/3), Army Corps of Engineers (1/15), U.S. Fish and Wildlife Service (1/3), and Animal and Plant Health Inspection Service (1/1).

Of the 20 FEISs that either dismissed EJ from their analyses or made a "no adverse impact" determination without a demographic analysis, six provided no explanation for the dismissal, one stated that there were no EJ populations in the affected area (without further explanation), two referenced focusing on marine resources where mainland populations would not be affected, two stated that there would be beneficial impacts, one stated that potential EJ impacts would be negligible, two stated that there were no EJ populations and that impacts would be beneficial, four stated that there would not be disproportionately high and adverse impacts, one stated that there would be ongoing consultation/collaboration with tribes, and one cited "equal access" being provided to all people. Table 6 in Appendix A provides the action types (e.g., flood management, mining, resource management plan, etc.) of FEISs that did not include a demographic analysis.

There are apparent trends associated with whether agencies conducted an EJ demographic analysis or not. For example, all five of the National Park Service FEISs in the sample explicitly dismissed EJ from their analysis, citing the fact that impacts would be beneficial, that no EJ population would be affected, or without providing any explanation. These EISs focused on mine remediation, ferry embarkation siting, invasive fish removal, and General Management Plans. Similarly, 10 of the 20 Forest Service FEISs in the sample did not conduct an EJ demographic analysis, with eight FEISs making a "no adverse impact" determination

without a demographic analysis, and two FEISs not mentioning EJ at all. These EISs focused on timber/fire management, habitat restoration, a travel management plan, and a proposed quarry.

Of the 73 FEISs that conducted an EJ demographic analysis, 66 identified a minority and/or low-income population and 7 did not identify an EJ population (Figure 2). Of the 66 FEISs that identified an EJ population, 8 identified disproportionately high and adverse impacts (for all action alternatives), 8 identified potentially disproportionately high and adverse impacts (for some action alternatives), 48 did not identify disproportionately high and adverse impacts (78.5%), and 2 deferred impact evaluations to a site-specific planning process (3.1%) (Figure 2).

Of the 8 FEISs that identified disproportionately high and adverse impacts, 6 incorporated or recommended EJ mitigation measures and 5 did not incorporate or recommend EJ mitigation measures (Figure 2). Of the 8 FEISs that identified potentially disproportionately high and adverse impacts, 2 incorporated or recommended EJ mitigation measures and 6 did not incorporate or recommend EJ mitigation measures (Figure 2). Of the 48 FEISs that did not identify disproportionately high and adverse impacts, 12 incorporated or recommended EJ mitigation measures and 36 did not incorporate or recommend EJ mitigation measures (Figure 2). In total, 20 FEISs included EJ mitigation while 80 FEISs did not.

EJ analysis conclusions

To catalog the conclusions reached from EJ analyses, the decision text of an analysis was read an evaluated. The EJ analysis conclusions are listed with the number of FEISs that referenced them in Table 7 in Appendix A.

Mitigation

Within the 20 FEISs that described EJ mitigation there were 53 mitigation measures described, with an average of 2.7 different mitigation measures described per FEIS. Table 1 lists the specific mitigation measures and the number of FEISs that employed them. Most mitigation measures described specific actions planned for implementation, although some were only recommendations, and others described additional planned outreach or analyses.

EJ mitigation	Number of FEIS's
General strategies	
Continued outreach and communication with the public	7
Change of project design	5
Accessibility/Transportation	
Improve pedestrian accessibility (sidewalks, separation of traffic)	4
Traffic Management Plan to be developed	3
Ongoing coordination with public transport authority	2
Improve driving accessibility (traffic signals and pavement markings)	2
Improve public transit accessibility (bus shelters)	1
Open space	
Increase or maintain tree canopy	3
Public art (murals/mosaics/design)	2
New public park	1
"Open space mitigation plan" to be developed	1
Additional recreation access	1
Community Resources	
Facilitate access to community buildings/businesses	3
Help local businesses identify preferred relocation options	2
Provide information to the public regarding business relocations/transit options	1
Jobs	
Preference for locals when hiring	2
Training programs for local residents to improve hiring potential	2
Involve local vendors	1
Informing the public about job opportunities	1
Noise	
Noise barriers	2
Temporary relocation of residents in noise-sensitive areas (case-by-case)	1
Quiet Zone on rail line through city	1
Other	
Maintain subsistence access where possible	2
Conflict Management Plan to be developed	1
Equity Assessment Analysis to be conducted	1
On-site staffed public office to accommodate drop-in visitors	1

Table 1. EJ mitigation measures described by FEISs in the sample. Twenty FEISs described 53 EJ mitigation measures in total.

Methods of EJ analyses

Unit of analysis and reference unit

In EJ demographic analyses, a local demographic unit of analysis is chosen and usually compared to a reference unit at a larger scale, using a threshold to determine whether a minority or low-income population is present (EPA, 2016). Seventy-one FEISs defined a unit of analysis, two did not state their unit of analysis, and 27 did not conduct a demographic analysis. The most common unit of analysis was at the census block group scale (30 FEISs), followed by county (24), census tract (20), city/town (15), study area (averaged) (5), census designated place (4), tribal reservation (4), and census county division (2) (Figure 3). FEISs sometimes used multiple units of analysis (e.g., city/town as well as county). On average, FEISs that defined a unit of analysis included 1.5 different units of analysis.

Sixty-one FEISs defined a unit of reference, six did not state their unit of reference, six employed no reference community in their methods, and 27 did not conduct a demographic analysis. The most common reference unit was at the state scale (36 FEISs), followed by county (25), town/city (8), country (3), and study area (averaged) (1) (Figure 3). FEISs sometimes used multiple reference units (county as well as state, for example). On average, FEISs that defined a unit of analysis included 1.2 different reference units.

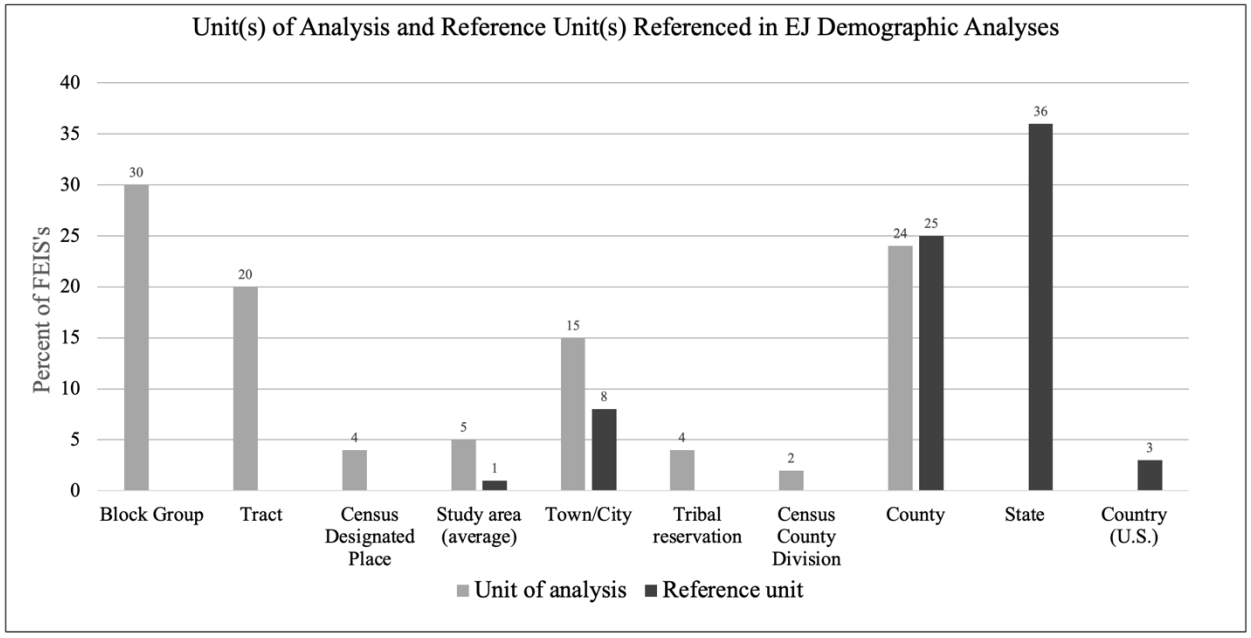

Figure 3. Unit(s) of analysis and reference unit(s) used in demographic analyses in the sample. The x-axis is scaled from smallest to largest geographic area

Type and age of demographic data used

Seventy-one FEISs provided some type of race/ethnicity demographic data of the affected area while 29 did not. Seventy-two FEISs provided some type of low-income demographic data while 28 did not. The types of minority and low-income demographic data identified in the sample are provided in Tables 8 and 9 of Appendix A.

65 FEISs noted the year the data was sourced from the U.S. Census Bureau or Department of Health and Human Services. Figure 4 shows the relative age of demographic data referenced from the time of publication (in years), with a mean of 3.9 years and a median of 4.0 years.

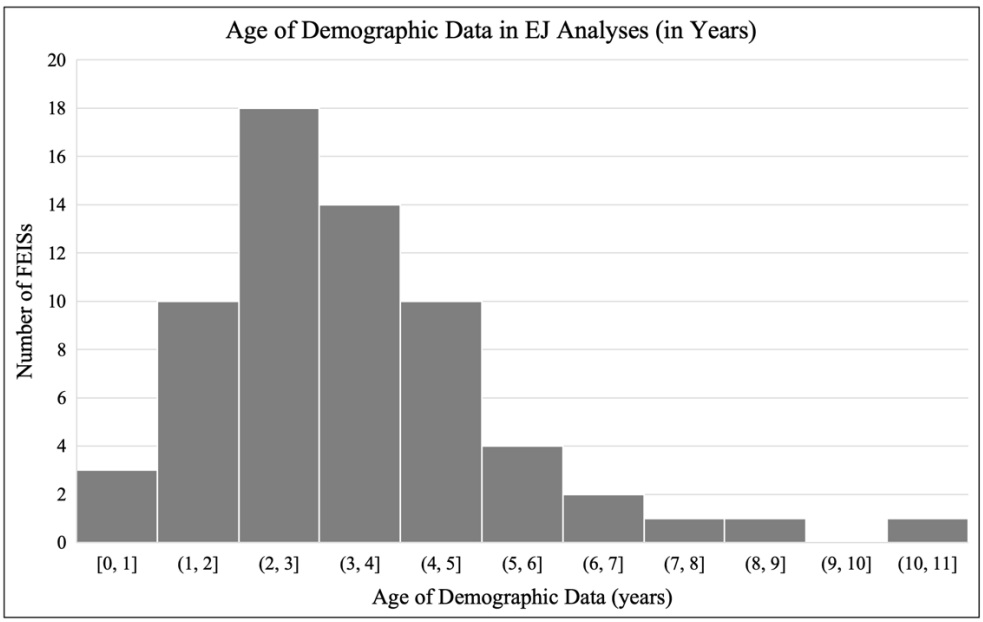

Figure 4. Histogram showing the relative age of demographic data referenced from the time of FEIS publication (in years). FEISs sourced demographic data from the U.S. Census Bureau or the Department of Health and Human Services. Mean of 3.9 years, median of 4.0 years.

Minority and low-income thresholds

Sixty-one FEISs defined a minority threshold, 12 did not state what minority threshold was used, and 27 did not perform a demographic analysis. Twenty-eight minority thresholds combinations were identified in the sample (Table 2), made up of 20 different thresholds (Figure 5, Appendix A). The most common minority threshold combination was "total minority > 50% *or* total minority meaningfully greater than reference unit" (11 FEISs).

Fifty-seven FEISs in the sample defined a low-income threshold, 16 did not state what low-income threshold was used, and 27 did not perform a demographic analysis. Thirty low-income threshold combinations were identified in the sample (Table 3), made up of 24 different thresholds (Figure 6, Appendix A). The most common poverty threshold was "percent in poverty > reference unit" (15 FEISs) followed by "median household income < poverty level" (5 FEISs).

For thresholds that refer to "any minority," the FEISs compared demographic data of each minority group separately (African-American, American Indian/Alaskan Native, Hispanic

and/or Latino, Asian-American, and Native Hawaiian/other Pacific Islanders) to the reference unit to determine if there was an EJ population. For thresholds that refer to "total minority," the FEISs used the combined minority population to compare to the reference unit. As U.S. Census data does not explicitly provide a "total minority" demographic, FEISs determined the total minority population by either subtracting the white-alone non-Hispanic population percentage from 100, or by adding together the different minority percentages.

Thresholds written as "percent greater" in FEISs are reported separately from thresholds written as "percentage points greater." When comparing demographic data (percentages), a threshold of 20% greater than a reference unit is different from 20 percentage points greater. For example, if comparing a 40% minority population to a 30% minority reference unit, 20% greater would be a 36% threshold while 20 percentage points greater would be a 50% threshold, thereby resulting in different EJ determinations.

In the case of thresholds that refer to minority or low-income thresholds being "meaningfully greater" or "meaningfully lower" than a reference unit, no definition was provided in the FEISs.

Minority threshold combination	Percent of FEISs
Any minority	1
Any minority "meaningfully greater" than reference	1
Any minority > reference	1
Any minority > reference **OR** Tribes in affected area	1
Total minority > 50%	8
Total minority > reference	2
Total minority > reference **OR** Tribes in affected area	1
Total minority > 50% **OR** any minority "meaningfully greater" than reference	6
Total minority > 50% **OR** any minority "meaningfully greater" than reference **OR** Tribes in affected area	1
Total minority > 50% **OR** any minority > reference **OR** "identifiable cluster"	1
Total minority > 50% **OR** any minority 10 percentage points > reference	1
Total minority > 50% **OR** any minority 10% > reference	1
Total minority > 50% **OR** any minority 10% > reference **OR** Tribes in affected area	1
Total minority > 50% **OR** any minority 20 percentage points > reference **OR** any minority 20% > reference	1
Total minority > 50% **OR** any minority 20 percentage points > reference **OR** identifiable cluster	1
Total minority > 50% **OR** total minority > reference	4
Total minority > 50% **OR** total minority "meaningfully greater" than reference	11
Total minority > 50% **OR** total minority "meaningfully greater" than reference **OR** Tribes in affected area	2
Total minority > 50% **OR** total minority "meaningfully greater" than reference **OR** tract identified on EPA's Ejscreen tool	1
Total minority > 50% **OR** total minority "meaningfully greater" than reference **OR** Hispanic population "meaningfully greater" than reference	1
Total minority > 50% **OR** total minority > reference **OR** Hispanic population "meaningfully greater" than reference	1
Total minority > 50% **OR** total minority 5 percentage points > reference	1
Total minority > 50% **OR** total minority 10 percentage points > reference	3
Total minority > 50% **OR** total minority 10% > reference	2
Total minority > 50% **OR** total minority 15% > reference	1
Total minority > 50% **OR** total minority 20% > reference	4
Total minority > 50% **OR** total minority 100% > reference **OR** Tribes in affected area	1
Total minority 20% greater than reference	1
Not stated	12
No analysis	27
N	100

Table 2. Minority threshold combinations found in the sample. If a minority population meets any threshold within a combination it is considered an "EJ population." For simplicity, thresholds that refer to "greater-than-or-equal-to" and those that refer to "greater-than" were combined in this analysis. Thresholds labeled as "%" are different from thresholds labeled as "percentage points" (see explanation in text). "Reference" refers to reference unit.

Low-income threshold combinations used	Percent of FEISs
Percent in poverty "meaningfully greater" than reference	2
Percent in poverty "meaningfully greater" than reference **OR** "identifiable cluster"	1
Percent in poverty > reference	15
Percent in poverty > reference **OR** percent of families in poverty > reference	1
Percent in poverty 5 percentage points > reference	1
Percent in poverty 5 percentage points > reference **OR** percent under 50% poverty level 5 percentage points > reference **OR** percent under 150% poverty level 5 percentage points > reference	1
Percent in poverty 10% > reference **OR** per capita income 10% < reference	1
Percent in poverty 50% > reference	1
Percent in poverty 100% > reference	1
Percent in poverty 100% > reference **OR** median household income "substantially lower" than reference	1
Percent in poverty > 50%	2
Percent in poverty > 50% **OR** percent in poverty "meaningfully greater" than reference	3
Percent in poverty > 50% **OR** percent in poverty > reference	3
Percent in poverty > 50% **OR** percent in poverty 5 percentage points > reference	1
Percent in poverty > 50% **OR** percent in poverty 10 percentage points > reference	1
Percent in poverty > 50% **OR** percent in poverty 10 percentage points > reference **OR** median household income 10 percentage points < reference	1
Percent in poverty > 50% **OR** percent in poverty 20 percentage points > reference **OR** identifiable cluster	1
Percent in poverty > 50% **OR** percent in poverty 20% > reference	2
Percent in poverty > 50% **OR** percent in poverty 100% > reference	1
Percent in poverty > 20% (U.S. Census "poverty area")	3
Percent in poverty > 20% (U.S. Census "poverty area") **OR** percent in poverty > reference	1
Percent in poverty > 20% (U.S. Census "poverty area") **OR** percent in poverty "substantially greater" than reference	1
Percent in poverty > 20% (U.S. Census "poverty area") **OR** percent below 200% poverty level 20% greater than reference	1
Percent in poverty > 20% (U.S. Census "poverty area") **OR** tract identified on EPA's EJscreen tool	1
Percent below 150% poverty level > reference	1
Percent below 200% poverty level > 50% **OR** percent below 200% poverty level 20% greater than reference	1
Median household income < reference	1
Median household income < poverty level	5
Percent of families in poverty > reference	1
Percent of families in poverty 100% > reference	1
Not stated	16
No analysis	27
N	100

Table 3. Low-income threshold combinations found in the sample. If a low-income population meets any threshold within a combination it is considered an "EJ population." "DHHS" refers to the Department of Health and Human Services. For simplicity, thresholds that refer to "greater-than-or-equal-to" and those that refer to "greater-than" were combined in this analysis. Thresholds labeled as "%" are different from thresholds labeled as "percentage points" (see explanation in text). "Reference" refers to reference unit.

Other thresholds

In addition to minority and low-income thresholds, two FEISs used other thresholds to identify EJ populations. One EIS assessed whether the percentage of limited English proficiency individuals was greater than the reference population. Another FEIS assessed whether the percentage of youth (18 years of age and under) or seniors (over 64 years of age) were greater than the reference population.

Impact assessment methods

Providing multiple alternatives and comparing impacts between alternatives is a central part of the NEPA process (U.S. Congress, 1969). With respect to EJ analyses, CEQ and EPA direct agencies to evaluate which alternative(s) have the least disproportionate and adverse effect on low-income and minority populations (CEQ, 1997; EPA, 2016). In the sample, 46 FEISs compared EJ impacts (of any detail) between alternatives and 54 FEISs did not provide a comparison.

NEPA also requires agencies to look at cumulative impacts to which a project may contribute (E.O. 12898, 1994). For EJ analyses, CEQ cites the need to consider cumulative impacts "even if certain effects are not within the control or subject to the discretion of the agency proposing the action" (CEQ, 1997). In the sample, 42 FEISs mentioned or discussed cumulative impacts (or the lack thereof) in relation to EJ and 58 FEISs did not mention or discuss cumulative impacts in relation to EJ.

Twelve FEISs referenced the use of an EJ mapping tool (EPA's EJScreen) while 88 FEISs made no reference to the use of a mapping tool. EJScreen was the only EJ mapping/screening tool mentioned in FEISs in the sample.

Twenty FEISs in the sample provided some type of EJ map of the project, while eighty FEISs provided no EJ-specific maps. Of the 20 FEISs that included an EJ map of some sort, 13 provided a map with minority and low-income demographic layers, three provided a map showing identified EJ populations only, one provided a map with a minority demographic layer only, one provided a map with a low-income demographic layer only, and two provided a map showing the identified EJ populations along with a layer showing project impacts.

Discussion

Introduction

This paper sought to answer the questions "What were the outcomes and determinations of EJ analyses in FEISs?" and "How were agencies performing EJ analyses in FEISs?" For both questions, EJ analyses could be evaluated by two main sections, the demographic analysis and the impact analysis. The major outcomes and determinations of EJ analyses are displayed as a flow diagram in Figure 2. The specific methods of EJ analyses are described, and show a wide variation in agency methods, especially in the use of minority/low-income thresholds and units of analysis/reference units. Some of the results presented in this study have not been previously reported, including the percent of FEISs that identified EJ populations, disproportionately high and adverse EJ impacts, utilization of EJ mitigation, the length of EJ analyses, the type and relative age of demographic data used, specific units of analysis and reference units used, whether alternatives were compared in relation to EJ, whether cumulative EJ impacts were assessed, whether EJ mapping tools were used, and whether EJ maps were provided.

Comparison with other NEPA EJ literature

This study finds greater variation in EJ analysis methods than the described by Becker-Turk *et al.*. Becker-Turk *et al.* identified eight different EJ threshold combinations in their sample (46 EISs), while this study identifies 28 minority thresholds and 30 low-income thresholds. Differing results may be due to a wider geographic scope of this study (nationwide versus state of Arizona), a larger sample size (sample size of 100 versus 46), and a higher number of lead agencies sampled (28 agencies versus 14) (Becker-Turk *et al*., 2023).

This study and Becker-Turk *et al.*'s paper also differ in methods in measuring adverse impacts, the presence of impact analyses, minority and low-income thresholds, and units of analysis/reference units. For adverse impacts, Becker-Turk *et al.* used the variable "negative EJ impacts expected" while this study used the variable "disproportionately high and adverse impacts identified." In coding for the presence of an EJ analysis, Becker-Turk *et al*. identified whether there were "EJ impact analyses findings" while this study looked at whether an EJ demographic analysis was conducted. In reporting thresholds, Becker-Turk *et al*. report minority, low-income, and other thresholds as a single "EJ threshold", while this study reports them separately. In reporting units of analysis and reference units, Becker-Turk *et al*. report them as a combined "EJ community boundary" while this study reports them separately. In summary, the methods of this study provide greater detail than the methods described by Becker-Turk *et al*.

Length of EJ analyses

Although there is no length requirement or recommendation for EIS EJ assessments, understanding the length of text associated with EJ assessments can be informative in

understanding general trends. With 4% of FEISs not mentioning EJ at all, it is apparent that the evaluation of EJ impacts is not universally followed within the NEPA process. With 30 FEISs writing less than a page, and a median of 3.0 pages of EJ-related text, it is also apparent that EJ analyses are often short in length.

FEISs without EJ demographic analyses

There is an argument that an EJ demographic analysis should have been conducted in some of the FEISs that did not do so. For example, the four FEISs that stated that there were no EJ populations in the affected area could have provided a demographic analysis to show such a result. FEISs that stated that EJ populations would benefit from the proposed project could have conducted a demographic and impact analysis in order to identify if benefits were proportional for EJ populations. FEISs that incorporated other NEPA processes by reference could have provided the relevant information and analyses from those processes. When examined more closely, it was found that one FEIS cited by reference consisted of a different affected area as well as different alternatives being evaluated, thereby invalidating the comparison. Another FEIS cited by reference had been completed 7 years prior, in which time the demographics of the affected area may have changed significantly. There was also a potential issue with some FEISs that described the fact that they provided "fair treatment and meaningful involvement" for all people, but did not make any statements regarding the proportionality or adversity/benefits of impacts. In summary, it is apparent that FEISs often exclude EJ from their analyses without adequate justification.

In evaluating agencies that did not conduct a demographic analysis, there may be a trend for the National Park Service (NPS) and Forest Service (FS) to not conduct demographic

analyses (5/5 FEISs and 10/20 FEISs, respectively). This may be explained by the characteristic of NPS and FS projects to focus on Federal land where there may be no demographic data associated with the affected area. However, demographic data specific to recreational users may be available. One FS FEIS referenced state survey data of the ethnicity of recreational users in Arizona (Forest Service, 2019). Identifying and/or collecting demographic data on recreational users may help land management agencies conduct EJ analyses relevant to the affected area of their projects when other demographic information is unavailable.

Addressing the proportionality of beneficial impacts

An issue that became apparent over the course of this study was the wide variation in how FEISs referred to the level and scope of EJ impacts. FEISs variously discussed duration (temporary, short-term, medium-term, long-term), magnitude (negligible, minor, moderate, major), distribution (localized, regional), likelihood (unlikely, possible, probable), adverse/beneficial, significant/insignificant, and indirect/direct impacts. The only consistent way to evaluate a level of impact across FEISs in the sample was using the "disproportionately high and adverse" impact language that most FEISs refer to and that is referred to in E.O. 12898. The problem with this root guidance is that although it appropriately directs agencies to identify and address disproportionately high and adverse impacts, it does not address the proportionality of beneficial impacts, which is arguably of similar importance. More broadly, the definition of environmental justice may benefit by describing the general fairness of impacts across communities, both adverse and beneficial.

There has been a recent shift in EJ policy that aims to address this issue. In 2021, President Biden signed Executive Order 14008 (Biden, 2021), "Tackling the Climate Crisis at

Home and Abroad" which created the Justice40 initiative. The Justice40 initiative calls for 40% of the benefits of certain federal projects to flow to disadvantaged communities. The initiative focuses on the areas of clean energy/energy efficiency, clean transit, affordable/sustainable housing, training/workforce development, remediation/reduction of legacy pollution, and development of clean water infrastructure (E.O. 14008). E.O. 14008 resulted in CEQ creating the Climate and Economic Justice Screening Tool (CEJST), a geospatial screening tool to identify disadvantaged communities to benefit from the Justice40 initiative (CEQ, 2022).

Despite the creation of the Justice40 initiative and the CEJST, the issue of evaluating the proportionality of beneficial impacts in NEPA reviews has not been fully addressed. The Justice40 initiative focuses on the distribution of federal investments, specifically on projects associated with addressing climate change, and does not define methods that agencies should use across EJ NEPA analyses. CEQ should modify regulations to define EJ as the need to not only identify and address disproportionate adverse impacts on minority and low-income communities, but also to identify and address proportional beneficial impacts for minority and low-income populations. By placing the needs for proportional benefits similarly as the need to avoid disproportional adverse impacts, NEPA assessments might benefit from a more thorough, less skewed analysis of the distribution of project impacts, both adverse and beneficial. Additionally, evaluating beneficial impacts may result in additional EJ mitigation actions being taken to assist communities. By including mitigation measures to benefit EJ populations proportionally, the FEIS process can result in positive impacts to EJ populations versus adverse or neutral impacts.

Calculating minority population

CEQ's 1997 guidance defines minorities as "individual(s) who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic" (CEQ 1997). EPA recommends that minority populations be defined as "all individuals other than non-Hispanic whites" (EPA, 2016). By these two definitions different methods of determining the minority population can be used: either by adding together the different race/ethnicity groups (American Indian/Alaskan Native alone, Black or African American alone, Asian alone, Native Hawaiian and Other Pacific Islander alone, some other race alone, multiracial/non-Hispanic, and Hispanic of any race) or by subtracting the white alone/not Hispanic percentage from 100. Although it seems as though FEISs used one of these two methods to reach a "total minority" metric, the specific calculation was seldom described, potentially leading to variation in how the total minority population was determined. For example, EIS preparers might not always understand the nuances of how the U.S. Census Bureau collects race versus ethnicity data and the potential for double-counting or under-counting. To improve consistency, it would be prudent for CEQ to recommend a specific method to calculate the total minority percentage from U.S. Census data.

Unit of analysis and reference unit

When selecting the demographic unit of analysis for minority populations, CEQ's 1997 guidance states that "The selection of the appropriate unit of geographic analysis may be a governing body's jurisdiction, a neighborhood, census tract, or other similar unit that is to be chosen so as to not artificially dilute or inflate the affected minority population." With regard to the use of a reference community, EPA's 2016 guidance directs agencies to "select an

appropriate geographic unit of analysis (e.g. block group, census tract) for identifying [minority or low-income] populations in the affected environment" and to "Select [an] appropriate reference community (e.g., county, state) to compare against the geographic units of analysis."

This study found that agencies followed CEQ and EPA's guidance when selecting appropriate units of analysis and reference units for demographic analyses, with the most common demographic comparison being between a census tract/block group to a county.

Minority and low-income thresholds

CEQ guidance states that minority populations should be identified "where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis" (CEQ, 1997). EPA guidance states that "the *Meaningfully Greater* analysis requires use of a reasonable, subjective threshold (e.g., ten or twenty percent greater than the reference community)…with some agencies considering any percentage in the selected geographic unit of analysis that is greater than the percentage in the appropriate reference community to qualify as being meaningfully greater" (EPA, 2016).

With regard to identifying low-income populations, CEQ guidance states that "Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty," however no specific measures are provided (CEQ 1997). EPA guidance states that "Low-income status need not always be capped at the poverty level. In some instances, it may be

appropriate for agencies to select a threshold for identifying low-income populations that exceeds the poverty level" (EPA, 2016).

Given the lack of guidance on what "meaningfully greater" means, or what low-income measures/thresholds agencies should use in their demographic analyses, it is not surprising that there was a high degree of variation in the types of minority and low-income thresholds used in the sample. Although it appears that neither CEQ nor the EPA have sought to shape agencies' ability to define their own demographic analysis, the result has been a high degree of variation, with 28 different minority threshold combinations and 30 different low-income threshold combinations found in this study. With the lack of defined guidance, the flexible use of demographic thresholds may unintentionally allow FEIS preparers to guide the outcome when identifying minority and/or low-income populations by choosing to use a more inclusive or a more conservative threshold.

It is worth noting that 8 FEISs in the sample used only the minority threshold of "greater than 50% of the population," and did not include any type of "meaningfully greater" threshold, as directed by CEQ. This may be because of a misunderstanding of CEQ guidance. CEQ's 1997 guidance states that "minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the [reference unit]." EIS preparers may misinterpret "or" as an option, versus "where either" as stated in CEQ guidance.

The high degree of variation shown in this study indicates that more specific guidance is needed for identifying EJ populations, either by defining specific thresholds or by recommending or requiring the use of an EJ mapping tool (such as EJScreen or CEJST).

Tribal Reservations

CEQ's 1997 EJ guidance includes Indian Tribes with minority and low-income populations as populations to be evaluated in EJ analyses (CEQ, 1997). However, this study found that only seven FEISs included Tribal reservations as a threshold (included with minority thresholds for the purpose of this study). All EISs should include Tribal reservations as a threshold for EJ demographic analyses.

Age of demographic data

Although there is no specific guidance on how recent demographic data should be when conducting demographic analyses, EPA guidance states that **"**using the most current poverty data is preferable" (EPA, 2016). The mean age of data of 3.9 years found in this study may be reasonable when one considers that it often takes years from initial scoping until the completion of a FEIS.

However, one FEIS referenced demographic data that was 11 years old at the time of publishing. As most EISs reference U.S. Census American Community Survey 5-year estimates, this EIS may have benefited from updating the data used in its demographic analysis.

EJ mapping

Showing EJ data spatially though the use of maps is recommended by both CEQ and EPA (CEQ, 1997; EPA, 2016). CEQ explains that "displaying available data spatially…can provide the agency and the public with an effective visualization of the distribution of health and environmental impacts among demographic populations" (CEQ, 1997). This study found that 20 FEISs provided a map showing EJ demographic data or identified populations, while 80 FEISs

did not. However, only two FEISs provided a map showing EJ populations overlayed with a layer showing project impacts. Although it can be helpful to see the spatial distribution of EJ populations, showing their distribution in relation to project impacts is much more helpful for planning purposes and when determining whether EJ populations are experiencing disproportionately high and adverse impacts. With this study finding only 2 FEISs in the sample mapped EJ populations with respect to project impacts, CEQ and EPA may find it prudent to emphasize the benefits and need for EJ geospatial analyses.

Geospatial mapping tools

As a part of the Justice40 initiative, CEQ released the Climate and Economic Justice Screening Tool in November 2022 (CEQ, 2022). The tool identifies disadvantaged populations by census tract that meet both a climate change, energy, health, housing, legacy pollution, transportation, or water/wastewater criteria as well as a low-income criterion (above the 65th percentile). The tool also identifies disadvantaged populations that meet both a workforce-development criteria and have a population where fewer than 10% of adults do not have a high-school diploma. Additionally, tracts that overlap tribal reservations are considered disadvantaged. It is worth noting that other minority populations are not evaluated in the CEJST.

In 2015, the EPA released the EJ mapping tool EJScreen to help agencies identify environmental and socioeconomic data relevant to EJ analyses (EJScreen, 2023). 12 FEISs in this study referenced the use of EJScreen in their analyses. EJScreen provides EJ indices which show the spatial relation of 13 environmental data factors (particulate matter, traffic proximity, hazardous waste proximity, etc.) to tracts that are above the 80th percentile in minority population, low-income population, unemployment rate, population with limited-English

speaking ability, low life expectancy rate, and population with less than a high-school education (EPA, 2016).

Given the relatively low adoption of EJScreen by agencies, CEQ and EPA may find it helpful to provide additional guidance to agencies to ensure wider adoption of EJ online mapping/screening tools.

EJ mitigation

In evaluating the types of mitigation employed to address EJ concerns, it becomes apparent that EJ mitigation varies from relatively complex and involved to simple and easy to incorporate. At the most complex/involved end of mitigation, FEISs incorporated building a new public park, building noise barriers, and assistance with relocation of businesses. At the simple end of mitigation, FEISs incorporated a preference for training/hiring locals, increasing tree canopy, and additional recreation access. CEQ and/or EPA may find it productive to conduct a comprehensive evaluation of different types of EJ mitigation to make the process more understandable and straight-forward for NEPA practitioners.

Conclusion

This study provides greater understanding to NEPA EJ analyses and can inform policymakers and practitioners of the methods, outcomes, and determinations of EJ analyses. A thorough review of 100 FEISs yielded a complex set of results that were organized and provided to the reader as best able. NEPA EIS analyses are highly variable, and may benefit from greater consistency in methods and use of terms.

Differences between EJ analysis methods provide insight into ways that the process can be clarified. CEQ and EPA may be able to improve the consistency and quality of EJ demographic analyses by specifying when demographic analyses are necessary, which demographic thresholds to use, and how to calculate total minority percentage. Similarly, EJ impact analyses may benefit by evaluating the proportionality of beneficial impacts and by providing maps of EJ populations and project impacts. Practitioners may benefit in having access to additional information on types of EJ mitigation that can be utilized.

Appendix A – Supplementary data

Agency	Number of FEISs in sample	Number of FEISs produced from 2016-2021	Percentage of FEISs from 2016-2021
Forest Service	20	132	19.2%
Army Corps of Engineers	15	77	11.2%
Bureau of Land Management	12	94	13.7%
Federal Energy Regulatory Commission	7	38	5.5%
Federal Highway Administration	5	39	5.7%
National Park Service	5	25	3.6%
Bureau of Reclamation	3	20	2.9%
U.S. Fish & Wildlife Service	3	32	4.7%
National Oceanic and Atmospheric Administration	3	17	2.5%
U.S. Navy	3	6	0.9%
Bureau of Indian Affairs	2	12	1.7%
Federal Railroad Administration	2	12	1.7%
Federal Transit Administration	2	12	1.7%
General Services Administration	2	4	0.6%
Tennessee Valley Authority	2	11	1.6%
Animal and Plant Health Inspection Services	1	6	0.9%
Bureau of Ocean Energy Management	1	7	1.0%
Department of State	1	2	0.3%
Department of Commerce	1	6	0.9%
National Marine Fisheries Service	1	17	2.5%
National Security Agency	1	1	0.1%
Nuclear Regulatory Commission	1	10	1.5%
Office of Surface Mining Reclamation and Enforcement	1	4	0.6%
U.S. Army	1	4	0.6%
U.S. Air Force	1	17	2.5%
U.S. Coast Guard	1	2	0.3%
Other federal agencies	0	57	8.3%
California Department of Transportation	2	8	1.2%
Other state agencies	0	12	1.7%
City of New York Office of Management and Budget	1	1	0.1%
Other local agencies	0	1	0.1%

Table 4. Lead agencies represented in sample and number and percentage of FEISs produced by lead agency from 2016-2021. Data sourced from EPA's NEPA database.

Department	Number of FEISs in sample	Number of FEISs produced from 2016-2021	Percentage of FEISs from 2016-2021
Department of the Interior	27	194	28.3%
Department of Agriculture	21	146	21.3%
Department of Defense	21	110	16.0%
Department of Transportation	9	72	10.5%
Department of Energy	7	51	7.4%
Department of Commerce	5	40	5.8%
Department of Homeland Security	1	4	0.6%
Department of Housing and Urban Dev.	0	4	0.6%
Department of Health and Human Serv.	0	3	0.4%
Department of State	1	2	0.3%
Department of Veterans Affairs	0	3	0.4%
Department of the Treasury	0	1	0.1%
Independent agencies	5	34	5.0%
State agencies	2	20	2.9%
Local agencies	1	2	0.3%

Table 5. Lead Departments represented in sample and number and percentage of FEISs produced by lead agency from 2016-2021. Data sourced from EPA's NEPA database. Independet agencies in the sample included Tennessee Valley Authority, Nuclear Regulatory Commission, and the General Services Administration. The state agency represented in the sample was the California Department of Transportation. The local agency represented in the sample was the City of New York, Office of Management and Budget.

Action type	Number of FEISs
Landscape restoration	6
Resource Management Plan	3
Military training/equipment/facilities	3
General Management Plan	2
Ferry embarkation siting	1
Fishery management plan	1
Invasive fish removal	1
Marine sanctuary expansion	1
Mine remediation	1
Pest management	1
Proposed quarry	1
Shoreline management plan	1
Travel Management Plan	1
Allotment management plan	1
Mine expansion	1
Wildlife management plan	1
Invasive plant treatment	1

Table 6. EIS action types that did not include an EJ demographic analysis (n=27).

EJ analysis conclusions	Number of FEISs
Benefits to EJ populations	26
Mitigation measures	22
Impacts would affect all populations similarly	18
Impacts are not disproportionate	15
EJ populations are far from project area	14
Adverse impacts are minor/temporary/not significant	11
No EJ community identified	9
No adverse impacts	8
Site-specific analyses will be performed	6
No direct impact	4
No high and adverse impacts	2
Not enough information	2
Continued consultation/coordination	2
Net neutral impacts	1
Disproportionately high and adverse	8
Potentially disproportionately high and adverse	8
No conclusion provided	*10*

Table 7. Conclusions reached from EJ analyses. Excluding the 10 FEISs that did not provide an explanation/conclusion, FEISs reached 1.6 different conclusions on average. "Mitigation measures" include references to non-EJ-specific mitigation measures.

Race/ethnicity demographic data	Number of FEISs
White alone	57
American Indian/Alaskan Native alone	55
African-American alone	54
Hispanic and/or Latino of any race	52
Asian American alone	52
Total minority	46
Native Hawaiian and other Pacific Islanders alone	45
Some other race alone	46
Two or more races	41
One race	5
White alone/not Hispanic	4
Total minority/non-Hispanic	1

Table 8. The types of race/ethnicity demographic data provided in the sample (n=71).

Low-income demographic data	Number of FEISs
Individuals below the poverty level	62
Median household income	46
Per capita income	25
Families in poverty	9
“Near poor” - between 100% and 150% poverty level	3
“Very poor” - under 50% poverty level	2
“Low income” - below 200% poverty level	2
Children in poverty	2
Elderly (65+) in poverty	2
Adults age 18-64 in poverty	1
Families with children in poverty	1
Single mother families in poverty	1
“Low income” - below 125% poverty level	1
Poverty by race	1
Poverty by gender	1

Table 9. The types of low-income demographic data provided in the sample (n=72).

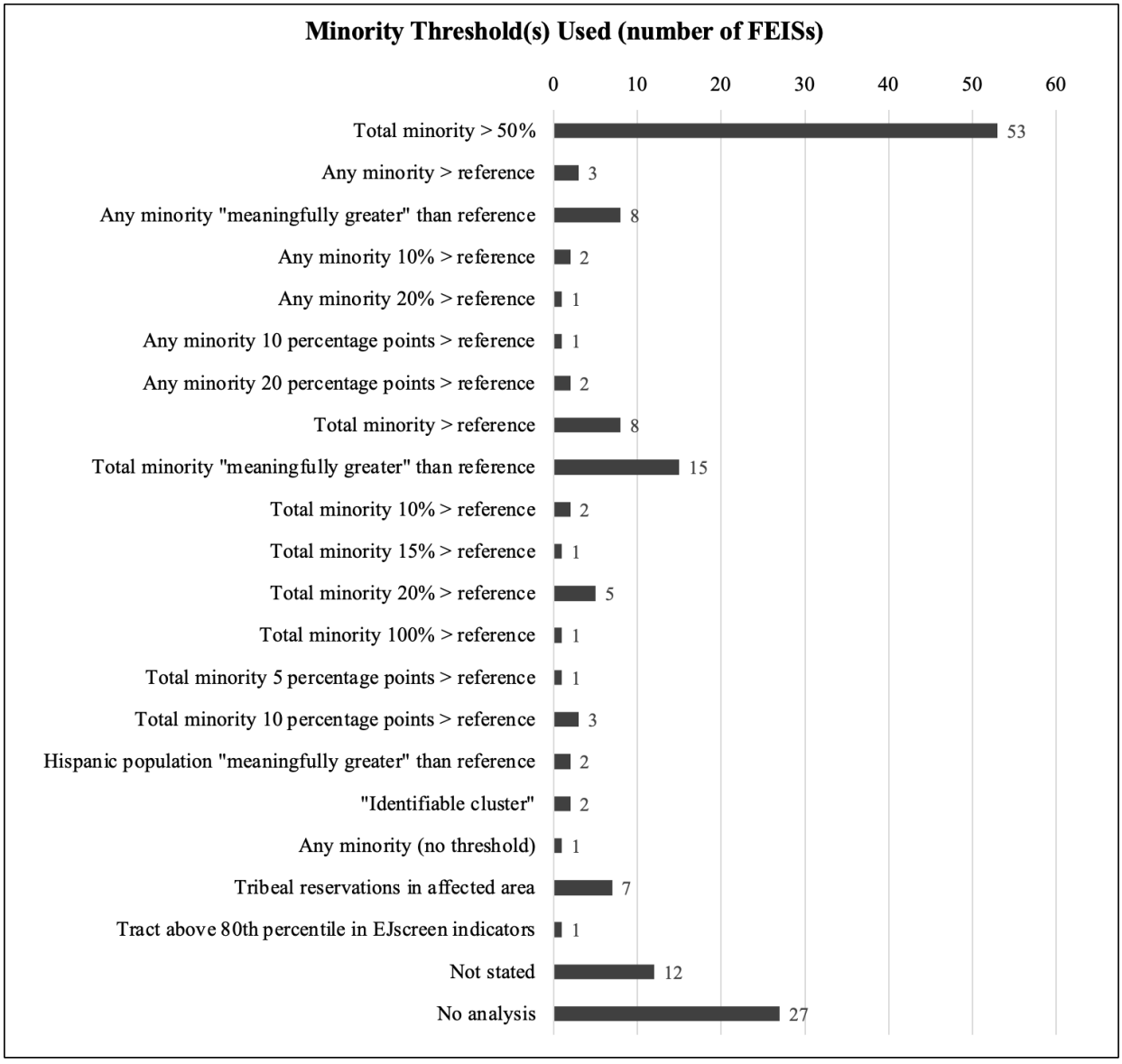

Figure 5. Minority thresholds identified in the sample. For simplicity, thresholds that refer to "greater-than-or-equal-to" and those that refer to "greater-than" were combined in this analysis. Thresholds labeled as "%" are different from thresholds labeled as "percentage points" (see results section for explanation). "Reference" refers to reference unit.

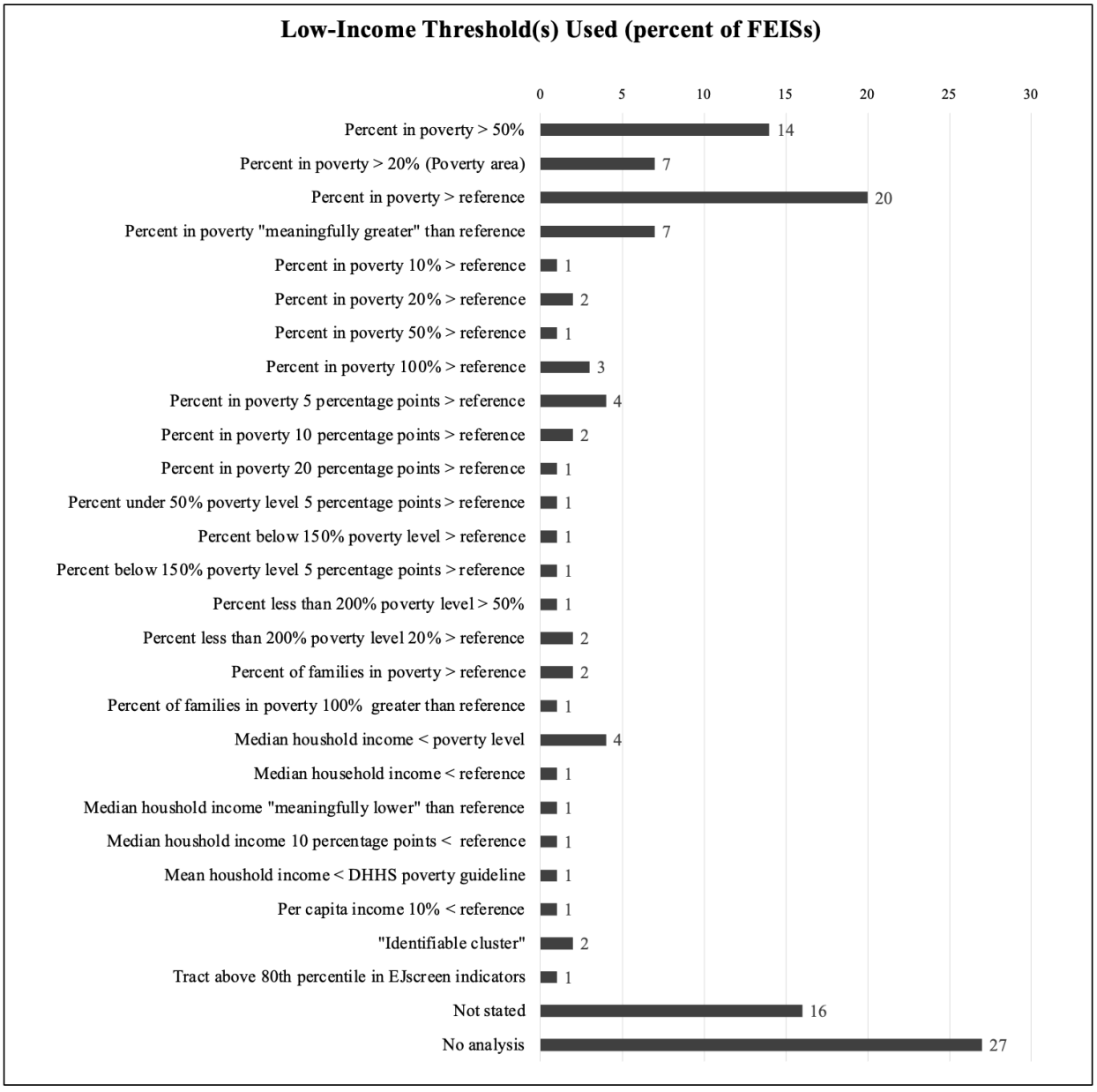

Figure 6. Low-income thresholds found in the sample. “DHHS” refers to the Department of Health and Human Services. For simplicity, thresholds that refer to “greater-than-or-equal-to” and those that refer to “greater-than” were combined in this analysis. Thresholds labeled as “%” are different from thresholds labeled as “percentage points” (see results section for explanation). “Reference” refers to reference unit.

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