Citizens of Ebey's Reserve Supplemental Comments on:

Final Environmental Impact Statement for EA-18G "Growler" Airfield Operations at Naval Air Station Whidbey Island
--January 30, 2019--

The following comments by Citizens of Ebey's Reserve (COER) supplement COER's comments submitted in December 2018 on the Final Environmental Impact Statement (FEIS) for EA-18G "Growler" Airfield Operations at Naval Air Station Whidbey Island (NASWI).

The following numbered excerpts in black font (#1 to 10) are from the final Environmental Impact Statement (EIS) and are challenged by COER in blue font as non-compliant with *best available science.*

Best Available Science [BAS]

 # 1 **EIS Page M-12:** In accordance with 40 Code of Federal Regulations 1502.22, for each resource area evaluated, the Navy researched and used the best available science and data, and clearly stated when some information is incomplete or unavailable for any resource under analysis."

COER Comment: Throughout its expanded Growler Environmental Impact Statement (EIS) the Navy references that it is legally bound under the National Environmental Policy Act (NEPA) to use the *best available science*. There is no NEPA guidance to use the *most convenient science* or to select the *science that best meets the agenda.*

Regulations for implementing the National Environmental Policy Act (NEPA) per §1502.24 Methodology and Scientific Accuracy: "*Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements. They shall identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement. An agency may place discussion of methodology in an appendix*." <https://www.energy.gov/sites/prod/files/NEPA-40CFR1500_1508.pdf>

Clearly NEPA compels agencies (here the Navy) to not only acquire and cite the best available science but to apply it ethically and efficaciously to the potential impact. Furthermore, where information seems lacking or inadequate, NEPA does not mandate the Navy to postpone action until more definitive research information becomes available, but quite the opposite, expects the Navy to acquire and properly apply "*the best existing scientific data*" to a pragmatic and objectively reasoned position on the effects to the proposed action.

§1500.1 Purpose...Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA.

§1502.22 Incomplete or unavailable information...(b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are

exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement: (1) A statement that such information is incomplete or unavailable; (2) a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment; (3) a summary of existing ***credible scientific evidence*** *which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and (4) the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community.* *[Note: If the info is available, the Navy would not have to use the credible sci evidende? Number 4 applies to use of 55DNL—the agencies using 65 are not the sci community.].* *For the purposes of this section, "reasonably foreseeable" includes impacts which have catastrophic consequences,* ***even if their probability of occurrence is low,*** *provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.*

Below we examine situations where, in regard to the proposed fourfold increase in Growler operations at Outlying Field Coupeville (OLFC), the EIS failed to

(1) acquire the most current and best science,

(2) efficaciously apply the critical findings, and/or

(3) skipped over important studies or obfuscated or misrepresented significant findings.

Those shortcomings fall well short of the "*professional and scientific integrity*" demanded by NEPA.]

Day-Night (DNL) Sound Level

 # 2 **EIS: 3.2.2.1 Day-night Average Sound Level (page 3-17 and 3-18):** The DNL metric is the energy-averaged sound level measured over a 24-hour period, with a 10-dB nighttime adjustment. DNL does not represent a sound level heard at any given time but instead represents long-term exposure. Scientific studies have found good correlation between the percentages of groups of people highly annoyed and the level of their average noise exposure measured in DNL (Schultz, 1978; USEPA, 1978). For additional details related to the latest analysis regarding people highly annoyed and related noise exposure, refer to Appendix A1 (Section A1.3.1) of the Aircraft Noise Study (Appendix A). DNL has been determined to be a reliable measure of long-term community annoyance with aircraft noise and has become the standard noise metric used by the FAA, USEPA, DoD, Federal Interagency Committee on Noise, American National Standards Institute (ANSI), and World Health Organization, among others, for measuring noise impacts…

Per DoDI 4165.57, DNL noise contours are used for recommending land uses that are compatible with aircraft noise levels. Studies of community annoyance in response to numerous types of environmental noise show that DNL correlates well with impact assessments (Schultz, 1978); a consistent relationship exists between DNL and the level of annoyance experienced (refer to Appendix A, Aircraft Noise Study). DoD recommends land use controls beginning at the 65 dB DNL level. Research has indicated that about 87 percent of the population is not highly annoyed by outdoor sound levels below 65 dB

DNL (FICUN [Federal Interagency Committee on Urban Noise], 1980). Most people are exposed to sound levels of 50 to 55 DNL or higher on a daily basis. **Therefore, the 65 dB DNL contour is used to help determine compatibility of military aircraft operations with local land use, particularly for land use surrounding airfields, and is the lower threshold for this analysis**.

EIS: Section A1.3.1 Annoyance (Appendix A1, page A1.23). Schultz's original synthesis included 161 data points. Figure A-8 compares revised fits of the Schultz data set with an expanded set of 400 data points collected through 1989 (Finegold et al., 1994). **The new form of the curve is the preferred form in the U.S., endorsed by FICAN (1997).** Other forms have been proposed, such as that of Fidell and Silvati (2004), but these have not gained widespread acceptance.

[**COER Comment:** That so-called "new form of the curve" is now over 20 years old and has recently been invalidated. As explained by Dr. Sandy Fidell, COER's highly respected international acoustics expert, the Navy is using old science...a discredited...invalidated…65 decibel Day-Night Noise Level (DNL) to index noise impacts on Ebey's Landing Historic Reserve.

The Navy claims "high annoyance" begins at a 65 decibel (dB) DNL level. Actually, that annoyance threshold is about 55 dB, as currently recognized by acoustical experts and organizations in the U.S. and over 90 other countries (see COERs February 2017 comments on the draft EIS and final EIS by Dr. Fidell). But that is an inconvenient truth for the Navy because a 10-dB difference nearly doubles loudness, expanding the impacted acreage and levels of high annoyance. As explained in his review of the Growler final EIS by Dr. Fidell, this violates NEPA (that review was submitted in November 2018 by COER to the Secretary of the Navy):

> The information of which readers of the Navy's obsolete boilerplate text are *not* informed directly contradicts and makes a mockery of the Navy's claim that "*this EIS uses the best available science as required under NEPA to develop an accurate analysis of potential noise impacts from the Proposed Action.*"...In reality, the Navy's EIS is based on outdated (1992-vintage) and incorrect technical information that greatly under-estimates the prevalence of aircraft noise-induced annoyance associated with the Proposed Action. The failure of the EIS to disclose accurate technical information to decision-makers **renders the document unfit for NEPA purposes**.

In his February 2018 review of the draft EIS, Dr. Fidell also judiciously explains the faulty science related to the 65-dB DNL, and he derides its being masqueraded as the threshold for high annoyance. The Navy, however, basically ignored that science and international scientific community. Reprehensibly, the Navy had certain knowledge of this correct science yet kept pushing the outdated 65 dB DNL as the threshold for high annoyance. That is not use of best available science.]

 # 3 **EIS: Footnote 26 on page 4-29:** In addition and as discussed further in Section 3.2.2.1, 65 dB DNL is the established federal standard for determining potential for high annoyance. This level has been identified in both the Federal Aviation Administration's (FAA's) Part 150 Program and the Department of Defense's (DoD's) Air Installations Compatible Use Zones (AICUZ) Program (including the individual Air Force and Navy programs) as a threshold for land use recommendations. Consistent with this guidance, 65 dB DNL is used to show areas with potential for high annoyance in this analysis.

However, aircraft noise does occur outside the 65 dB DNL contour. In order to more fully reflect the noise environment, the Draft EIS included noise contours of 60 dB DNL as well as detailed noise analysis for specific points of interest (POIs). In response to public comments, the Navy has expanded the analysis in the Final EIS to show geographic areas subject to greater than 55 dB DNL and has analyzed 18 additional POIs.

[**COER Comment**: First, the Navy's attempt to justify 65 DNL because the AICUZ program uses it is silly; it's kind of like the fox explaining that it was justified to guard the hen house because the coyote said so. Even worse, in our next section speaking to the DNL averaging method, the Navy throws the AICUZ program under the bus as having no pertinence or applicability to the Navy's choice of method. So is the AICUZ authoritative or not so much?

Second, the FAA focus is not acoustics research but is largely regulatory oversight. This is evident in the EIS literature cited section (chapter 7, page 7-14) which lists four FAA citations, none reporting research or acoustical findings. So, the fact that the FAA still uses the invalidated 65-dB threshold is a policy-level decision they are free to make because they are not legally bound to apply just the best available science but actually must apply other factors and interests to their policy decisions. That said, they cannot now justify use of the 20-year-old invalided 65 DNL as comporting with best science, but that is their problem.

Thirdly, the import of the Navy's inclusion of the 55-dB contour is nothing more than a gratuitous attempt to lip-serve the latest findings while actually using the old science as the annoyance threshold throughout the impact analyses.

Of course, this rather obvious calculation violates NEPA guidelines as explained in this report, *NEPA Analysis and the "Best Science".* <https://static1.squarespace.com/static/5411e35ae4b016536227bd80/t/54173e53e4b0cc9b6fe179a8/1410809427499/Enews+55.pdf>

> Regulations from the Council on Environmental Quality (CEQ) direct agencies to "insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements" (Section 1502.24)...CEQ's language emphasizes the need for agencies to use the best science! Here, then, are five key recommendations for integrating the best science into a NEPA analysis:
> 1. Survey published reports and studies, and record findings about which ones are the most current and relevant to the resource questions being asked.
> 2. Explain how cited studies apply to the site-specific resource conditions in the project area.
> ...4. Address questions and concerns from the public or from other governmental agencies and explain what the cited information does and does not show. (Here is where political considerations become an inevitable topic for discussion in any analysis of resource conditions.)

The original 65-dB DNL was derived by the Federal Interagency Committee on Noise (FICON) based on the dose/response Schultz Curve showing that 12.3% of the population is highly annoyed by aircraft noise at a 65-dBA DNL. Accepting that, the FAA and Congress subsequently adopted 12.3% as the annoyance threshold that should not be exceeded, and 65 DNL became the standard denoting high annoyance. That FAA and congressional "high annoyance" percentage (12%) has not changed, but due to the invalidation of the original Schultz curve, the DNL threshold denoting the high annoyance, to

comport with 12%, is actually 55 dB. This is reflected in EIS Table A-2, which for aircraft noise shows 12% high annoyance at 55 dB and 28% at 65 dB and 48% at 75 dB DNL. In spite of this, the Navy used 65 dB DNL to represent high annoyance.

Those metrics show that annoyance and the degrees of annoyance are not simply a matter of esoteric academic discourse; rather, annoyance has consequences that go well beyond interruption and mild irritation. As recognized in the EIS (page A1-41), "*annoyance can cause stress, and prolonged stress is known to be a contributor to a number of health disorders, such as hypertension, myocardial infarction (heart attack), cardiovascular disease, and stroke (Munzel et al., 2014)*." Noise annoyance and the stress it creates are not a binary thing (experienced or not experienced) but rather move on a sliding scale from low to moderate to severe, depending on noise level, frequency of occurrence, and individual sound sensitivity (e.g., those with hyperacusis or a lower tolerance of everyday sound [Aazh et al. 2018]).

So, recapping, (a) the accepted and congressional designation for high annoyance is 12% of the population, (b) the EIS used an invalidated 65 db DNL as the 12% high annoyance threshold, (c) best available science indicates that at 65 dB DNL actually about 25% to 28% of the population is highly annoyed, and (d) 55 dB DNL is the correct level at which 12% are high annoyed. This EIS charade with old science creates two very important consequences:

1) it understates the highly annoyed population, and

2) it understates the stress and related health impacts on the population.

This miscarriage and side-stepping of best available science violates the professional integrity expectation of NEPA, and as noted by Dr. Fidell, makes the EIS "unfit for NEPA purposes.]

#4 **EIS Page A1-25:** A factor that is partially non-acoustical is the source of the noise. Miedema and Vos (1998) presented synthesis curves for the relationship between DNL and percentage "annoyed" and percentage "highly annoyed" for three transportation-noise sources. Different curves were found for aircraft, road traffic, and railway noise. Table A-2 summarizes their results. Comparing the updated Schultz curve to these results suggests that the percentage of people highly annoyed by aircraft noise may be higher than previously thought.

[**COER Comment:** The "updated Schultz curve" refers to new data points added in the 1990s, but that Schultz data listed in Table A-2 was invalidated around 2017, making any contemporary comparisons to that data bogus. Regardless, Miedema and Oudshoorn (2001) reinforce Miedema and Vos (1998) with similar results on jet noise—i.e., aircraft noise is about 2 to 3 times more annoying than rail and highway noise (see EIS Table A-2). This is reinforced by the discussion of "step change" below (see # 9).]

DNL Averaging

 # 5 **EIS: 3.1.2.2.1 Average Annual Airfield Operations (page 3-13):** The affected environment (2021) for airfield flight operations is reflected in Table 3.1-3. During scoping, some commenters suggested that the noise analysis for OLF Coupeville should use a concept found in the Navy's Air Installations Compatibility Use Zones (AICUZ) Instruction (Chief of Naval Operation

Instruction 11010.36C) known as "Average Busy Day" (ABD). This measure of operational levels is highly conservative by accounting for noise only when flight operations occur and concentrating on those days when flight operations exceed the average number of flights for that airfield. **The Navy believes the ABD is inappropriate for this document**. First, it should be noted that ABD is an operational-level concept devised in the AICUZ program, and the intent of the AICUZ instruction is to help prevent incompatible development from affecting the flying mission of a Navy airfield. The AICUZ program encourages the use of the most conservative assumptions regarding projected airfield operations in order to prevent future encroachment, even if future operational assumptions may be somewhat speculative. Consequently, this underlying goal to prevent incompatible encroachment can result in overstated noise impacts. **The intent of this EIS is to support informed decision-making regarding the Proposed Action, not to support the AICUZ program's goals to prevent incompatible encroachment. Therefore, this EIS uses the best available science as required under NEPA to develop an accurate analysis of potential noise impacts from the Proposed Action.** Moreover, because of the interaction between Ault Field and OLF Coupeville, an accurate analysis requires a common measure. In several alternatives, the noise contours of Ault Field and OLF Coupeville merge, and using different units of measure at each airfield would result in inaccuracy to the noise analysis. **It would provide two results that are not directly comparable.** Finally, the alternatives, and particularly the sub-alternatives that provide for greater operations at OLF Coupeville, would make the ABD an inappropriate measure based on volume of operations. As the AICUZ instruction notes, the yearly average noise level, known as "Average Annual Day (AAD)," is the preferred unit of measure that the Navy believes accurately represents the noise impacts that may arise from the Proposed Action. The ABD metric is controversial due to the potential for inaccuracy noted above. Finally, the U.S. Air Force, which first adopted the ABD metric in 1977, has eliminated it from the Air Force AICUZ instruction (Air Force Instruction 32-7063, Air Installations Compatible Use Zones Program, dated December 18, 2015), and the Air Force Noise Program instruction (Air Force Instruction 32-7070, Air Force Noise Program, April 21, 2016) specifies the use of AAD. The day-night average sound level (DNL) noise zones are based on the AAD level in accordance with U.S. Department of Defense (DoD) Instruction (DoDI) 4165.57. Similarly, the Navy has begun the review to determine whether it should follow suit and eliminate ABD from the AICUZ program.

[**COER Comment:** First, rather than the Navy's abbreviations (AAD and ABD), which is a bit tedious, we will use BizAv for average busy day and AnnAv for average annual day.

Above, the EIS claims "*The intent of this EIS is to support informed decision-making regarding the Proposed Action...Therefore, this EIS uses the best available science as required under NEPA to develop an accurate analysis of potential noise impacts from the Proposed Action.*" This goal and claim ring hollow if BizAv and/or AnnAv fail to accurately "inform decision-making."

The Navy partially justifies its use of AnnAv (1) because the Air Force is no longer using BizAv in its AICUZ program, and (2) because the EIS applied AnnAvg in a manner consistent with DoD Instruction 4165.57. Both are really kind of silly because neither argument makes AnnAv scientifically valid?

The purpose for DNLs is to provide a numeric index of annoyance, either for a given single day and/or for an any average across days, e.g., AnnAv or BizAv but could be for weekend days or any such temporal category of interest. AnnAv and BizAv provide quite different insights on annoyance. While BizAv informs how annoyed folks are during days of noise dosage, AnnAv dilutes annoyance by the number of no-dose non-annoyance days of no flying. So, BizAv is like averaging 1-5 ratings for how sick you feel on days you are sick in year X, while the other averages those days of 1-5 ratings in with

the not-sick 0-rating days in the year. Hence, both metrics are relevant to assessing and understanding jet noise sickness.

The Navy argues that because it calculates DNLs via AnnAv for Ault Field, it must use AnnAv for OLFC in order to validly compare their DNLs. True enough, but that does not excuse the need for DNLs averaged without dilution at both Ault Field and OLFC. That is, using either AnnAv or BizAv without the other presents only half the picture and, likely, a stilted conclusion.

To further with another example, a researcher studying the effects of high temperature (heat stress) on animal behavior would find the average temperature across the four seasons not a particularly informative metric if taken alone, but would want to examine behavior on heat-stress days as well as the frequency of heat-stress days across time. To relate that to EIS, the Navy wants folks to look at just the average behavioral response to temperature across the four seasons: scientifically weak to worthless.

Growlers fly nearly every day at Ault Field so the Ault DNLs calculated under BizAv would be quite similar to DNLs calculated under AnnAv. However, under Navy's preferred option, Growlers would fly 100 to 170 days a year at OLFC; so, BizAv DNLs there would be far greater than AnnAv DNLs. Hence, the population, acreage, and overall impact metrics for high annoyance would be far greater for OLFC than are represented in EIS Table 4.2-1,whereas the impacts for Ault Field would be about the same.

So, the EIS non-use of BisAvg and exclusive use of AnnAv means that a large and very important annoyance consideration has been white-washed away at OLFC. The anticipated 100 to 170 days per year of OLFC flying is not a trivial number; it amounts to about 45% to 75% of the workweek days in the year of high to extremely high annoyance and the Navy needs to reveal how many people that affects, not use a diluted average that whitewashes the actual impacts. It needs to be compared legitimately to the same metric at Ault Field. If the EIS can only manage to use one averaging method (either BisAvg or AnnAv), then it is obligated to use the one that reflects actual annoyance (BisAvg). Going back to the sickness example, the question most would ask, because it is of logical interest, is, "On a scale of 1 to 5, how sick were you"? not "How sick were you, including all the days you felt just fine"?

Exacerbating that EIS understatement of impact, recent studies show that intermittent noise, like that experienced at OLFC, creates a greater annoyance reaction because of the "*step change*" from quiet ambient noise to extreme noise levels. Presumably the greater that *step up* in noise, the greater the annoyance reaction (see discussion below in # 9).

Furthermore, the >75 dB DNL in EIS Table 4.2-1 as the maximum DNL contour also masks the annoyance actually experienced in some locations. First, note that 85 dB is about twice as loud as 75 dB and 95 dB is about four times as loud as 75 dB. That in mind, JGL (2014)[1] recorded sound levels at four locations under OLFC flight path 32 (the most populated path) and found that on a day with just one night session (about 30-40 minutes), the DNL was 83.3 to 89.2, depending on location, and on a

[1] That report is included in COER's February 2018 comments on the draft EIS. JGL Acoustics, Inc. has been owned and operated by Jerry Lilly since 1983, who is a graduate of Whitman College and holds a Master's Degree in Engineering Acoustics from Penn State University (1975). He is a Fellow of the Acoustical Society of America (ASA); a board-certified member of the Institute of Noise Control Engineering (INCE); a licensed professional acoustical engineer in the state of Oregon, which is the only state with such a registration; and an active member of ASHRAE and the National Council of Acoustical Consultants (NCAC), ASTM.

day with two day and two night sessions the DNL increased to 86.7 to 92.6. Those DNL dosages are off the Navy's annoyance scale; yet under the preferred alternative, that and more will occur 100 to 170 days per year for over 1000 residences and businesses, as well as Ebey's Landing National Historic Preserve.

The EIS preparers are surely aware of their obfuscation--use of AnnAv coupled with the invalidated 65-dB DNL (discussed in the prior section)--that led to a smaller acreage for each noise contour and a smaller annoyed population within each contour. These transparent efforts to minimize the impacts can not be held up as an ethical or efficacious application of science or the principles set forth by NEPA (§1502.24) to ensure "*professional and scientific integrity."*

Health Impacts

 # 6 **4.2.2.3 Nonauditory Health Effects, Alternative 1 (Page 4-76):** Per studies noted and evaluated in Section 3.2.3, the data and research are inconclusive with respect to the linkage between potential nonauditory health effects of aircraft noise exposure. As outlined within the analysis of DNL contours and supplemental metrics presented within this section, the data show that the Proposed Action would result in both an increase in the number of people exposed to noise as well as those individuals exposed to higher levels of noise. However, research conducted to date has not made a definitive connection between intermittent military aircraft noise and nonauditory health effects. **The results of most cited studies are inconclusive and cannot identify a causal link between aircraft noise exposure and the various type of nonauditory health effects that were studied. An individual's health is greatly influenced by many factors known to cause health issues, such as hereditary factors, medical history, and life style choices regarding smoking, diet, and exercise. Research has demonstrated that these factors have a larger and more direct effect on a person's health than aircraft noise.**

Based upon public comments received on the Draft EIS, the Navy has expanded its nonauditory health effects literature review, using journals and published articles referred to by the Washington State Department of Health, the USEPA, and public comment submittals. Additional topics discussed included, but were not limited to, hypertension and cardiovascular health, lack of sleep, stress, and anxiety, and details can be found in Appendix A1 of the Aircraft Noise Study (Appendix A).

[**COER Comment:** The two paragraphs above are the Navy's final and full conclusion on the impacts of jet noise on nonauditory health. The same conclusion is reiterated verbatim for Alternatives 2 and 3.]

As explained in https://www.businessinsider.com/noise-pollution-effects-human-hearing-health-quality-of-life-2018-1, Americans are not taking noise exposure seriously. The problem is that noise and it's effects are invisible and gradual, yet cumulative, so generally not noticed until years later. Hence, the noise impact is easily overlooked, yet can be the causative or an exacerbating agent of malady. Stress, for example, is ubiquitously understood to have a solid relational link to noise and health problems, but it is not a bullet-like cause of organ or system failure; rather, stress works slowly, insidiously and potentially in conjunction with other catalytic agents to provoke ill-health.

The EIS conclusion excerpted above is almost entirely based on variables that complicate scientific extraction of the noise catalysts of health consequences. Those variables include, among others, the type of analytic metrics used (DNL, L_{eq}, etc.), the noise source (snoring, highway, aircraft noise), and

the dose—i.e., loudness or intensity, duration, and frequency (e.g., how does extreme intermittent noise differ in its effect from constant lower-decibel noise?). Then there are other types of considerations, e.g., does an animal body conditioned to relative quiet respond more to episodes of extreme noise than to less extreme but more frequent noise? Finally, the health parameter to be evaluated and the subjects' health factors.

We all know about individual risk variables that make the impacts of a causative factor not universal but selective, making some individuals (risk groups) more likely to be affected by a given environmental impact than others. These are confounding variables that good statisticians and researchers are able to gradually and meticulously unravel—and, in fact, have.

The EIS conclusion above and statements excerpted below clearly demonstrate the Navy's intent to paint such variations and inconsistencies in ways to discredit the nonauditory health impacts related to Growler noise. Its a familiar tactic reflected in the cigarette industry's attempt to discredit the health effects of tobacco and the oil industry's attempt to deny the link of carbon dioxide and methane to global warming.

#7 **EIS: Pages M-38 and M-39:** The National Environmental Policy Act does **not require** the Navy to develop best available science when the "overall costs of obtaining it [the information] are exorbitant or the means to obtain it are not known." Therefore, the Navy must rely on the best existing scientific data to determine the potential for impacts. Based on an exhaustive literature review, which was updated based on public comments, it is not possible to state that there is sound scientific evidence that aircraft noise is a significant contributor to health disorders. [**COER Note:** Please, there is not even a scientific consensus on global warming, but the military is solidly on record with the best available science conclusion that global warming is man-made and of grave concern. And the EIS exhaustive literature review claim has important problems we examine further below.]

Despite the intuitive feeling that noise in some way must impair health and some non-scientific articles supporting this theory, there are no studies that definitively show a causal and significant relationship between aircraft noise and health. Such studies are notoriously difficult to conduct and interpret because of the large number of confounding factors that have to be considered for their effects to be excluded from the analysis. The World Health Organization notes there is still considerable variation among studies. Almost without exception, research studies conclude that additional research is needed to determine whether such a causal relationship between noise and human health exists. The European Network on Noise and Health, in its summary report of 2013, concludes "…while the literature on non-auditory health effects of environmental noise is extensive, the scientific evidence of the relationship between noise and non- auditory effects is still contradictory." Because the best available science does not definitively show a causal and significant relationship between aircraft noise and health, it would be speculative to link any nonauditory health data collected to aircraft noise instead of to other factors.

[**COER Comment:** This statement hinges entirely on one word—*definitive*—by which the Navy means conclusive, unequivocal, indisputable. To achieve such a level of scientific certainty takes years of research to achieve. Recognizing this, the EIS has correctly noted (page M-38 and elsewhere) that **"***The National Environmental Policy Act does not require the Navy to develop best available science [BSA] when the 'overall costs of obtaining it are exorbitant or the means to obtain it are not known.'* ***Therefore, the Navy must rely on the best existing scientific data to determine the potential for***

impacts." Paraphrasing that, the Navy cannot sit on the fence waiting for the definitive cause and effect to become manifest. Instead, NEPA expects the Navy to not only acquire and cite the best available science but to apply it ethically and efficaciously in assessing the potential impact. The EIS, however, avoided any analysis of the nonauditory health impacts of its proposed actions by choosing not to rely on the *best scientific information* and by insisting it needs to wait for more "*definitive"* information. Hence, the only thing the EIS says in regard to impacts of Growler noise on nonauditory health is that they can't say anything about it. That not only side-steps NEPA, but flies in the face of the world's leading health experts, who have, in fact, decided there is a causal link between health and noise and even translated that science into a health impact analysis, as we examine below.

 # 8 **A1.3.5.6 Summary of Nonauditory Effects (page A1-49):** Research studies seem to indicate that aircraft noise may contribute to the risk of health disorders, along with other factors such as heredity, medical history, smoking, alcohol use, diet, lack of exercise, and air pollution, but that the measured effect is small compared to these other factors and often not statistically significant--i.e., not necessarily real. [**COER Note:** We should dismiss and not worry about rare diseases because they impact too small a percentage of the population? And, jet noise is not a problem if it exacerbates health risks for those with a heredity flaw, medical issue, misuse of tobacco or alcohol, sedentary life style, etc.? Really?] Despite some sensational articles purporting otherwise and the intuitive feeling that noise in some way must impair health, there are no studies that definitively show a causal and significant relationship between aircraft noise and health. Such studies are notoriously difficult to conduct and interpret because of the large number of confounding factors that have to be considered for their effects to be excluded from the analysis. **The WHO notes that there is still considerable variation among studies (WHO, 2011).** And, almost without exception, research studies conclude that additional research is needed to determine whether such a causal relationship exists. The European Network on Noise and Health (ENNAH, 2013), in its summary report of 2013, concludes that "…..while the literature on non-auditory health effects of environmental noise is extensive, the scientific evidence of the relationship between noise and non-auditory effects is still contradictory."

[**COER Comment:** Scientific research publications invariably point to where more research is needed as well as discuss other findings that support or disagree. That does not mean the findings do not eventually give way to clarity, reasonable certainty, and accepted conclusions. Hence, with regard to noise-health matters, we defer to the actual experts of the World Health Organization (WHO). The EIS statement above regarding WHO (2011) is portrayed as a conclusion, even though the Navy surely read the full publication and understands that this was not at all the conclusion reached from that study. Here is what this authoritative WHO (2011) publication actually concluded <http://www.euro.who.int/__data/assets/pdf_file/0008/136466/e94888.pdf>, they seemed to conveniently overlook its findings:

> For each outcome, the environmental burden of disease methodology...is applied to calculate the burden of disease in terms of disability-adjusted life-years (DALYs). With conservative assumptions applied to the calculation methods, it is estimated that DALYs lost from environmental noise are 61,000 years for ischaemic heart disease, 45,000 years for cognitive impairment of children, 903,000 years for sleep disturbance, 22,000 years for tinnitus and 654,000 years for annoyance in the European Union Member States and other western European countries. These results indicate that at least one million healthy life years are lost every year from **traffic related**

> noise in the western part of Europe. Sleep disturbance and annoyance, mostly related to road traffic noise, comprise the main burden of environmental noise.

And that is traffic noise; jet noise seems to 2 to 3 times worse, as discussed in detail in # 4. Furthermore, the EIS avoided mention of WHO's most current (2018) extensive study related to aircraft noise <http://www.euro.who.int/__data/assets/pdf_file/0009/383922/noise-guidelines-exec-sum-eng.pdf>

> For average noise exposure, the GDG strongly recommends reducing noise levels produced by aircraft below 45 dB L_{den} [COER: very similar to DNL], **as aircraft noise above this level is associated with adverse health effects.** For night noise exposure, the GDG strongly recommends reducing noise levels produced by aircraft during night time below 40 dB L_{night}, as night-time aircraft noise above this level is associated with adverse effects on sleep. To reduce health effects, the GDG strongly recommends that policy-makers implement suitable measures to reduce noise exposure from aircraft in the population exposed [to these threshold levels].

And, the full report provides all the details:
<http://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf?ua=1>.

Unlike the authors of the EIS, we cannot stress enough that these exhaustive WHO analyses were conducted by the some of the world's leading medical and acoustics experts. Their conclusions on the impacts are derived from their scholarly and complete understanding of all the best and most current scientific literature. That review included hundreds of peer-reviewed research studies, as well as meta-analyses that amalgamated all the best and most current research findings on noise-health impacts. Meta-analysis is a statistical technique that combines results from a large number of studies (often 100s or more) to produce a quantitative estimate of an overall effect; i.e., it is a statistical procedure for pooling data from many discrete findings to sort out the confounding variables to obtain the best possible answer.

The WHO findings closely reflect the conclusions of COER's retained expert, Dr. James Dalgren (as submitted as one part of COER's diverse comments on the draft EIS). Dr. Dahlgren likewise provided extensive credible evidence of heath impacts from toxic noise, including, his WHO (2010) publication.

So, it is of some disconcert, to see the list of EIS preparers (Chapter 8) included no medical or acoustical experts at all. In fact, the closest expertise included 3 individuals with bachelors degrees and 3 with masters degrees who had an environmental or biological work and/or educational background. They seem to want to wave about studies that were inconclusive, and attempt to hide or disguise those advancing the reality of a noise-based effect on health. Their EIS conclusion (*not enough science to say anything*) juxtaposed to WHO's conflicting conclusion seems to reflect a healthy level of professional naivety falling well short of the professional credibility expected in a scientific debate.

#9 **EIS Page A1-26 & 27:** In a study related to assessing aircraft noise exposure...which discussed, among other noise effects, annoyance and human response to changes in noise exposure versus steady-state response (Section 7.9 of the report) (Brisbane Airport Corporation, 2007). The authors suggest there is a difference between the gradual increase in noise exposure and the additive property of increasing noise levels from a particular event. The latter is called a "step change." The Brisbane Health Impact Assessment references Brown and Kamp (2005), who have reviewed the literature available on human response to such changes. They observe:

> Most information on the relationship between transport noise exposure and subjective reaction (annoyance/dissatisfaction) comes from steady state surveys at sites where there have not been step changes in noise exposure. Environmental appraisals often need to assess the effects of such step changes in exposure, and there is growing evidence that when noise exposure is changed, annoyance-ratings may change more than would be predicted from steady state relationships. "Conventional wisdom is that human response to a step change in exposure to transport noise can be predicted from exposure-response curves that have been derived from studies where human response has been assessed over a range of steady-state noise conditions. However, in situations where a step change in transport noise exposure has occurred, various surveys suggest that human response may be different, usually greater, as a result of the increase/decrease in noise, to what would be predicted from exposure-response curves derived under steady-state conditions. Further, there are suggestions that such (over)reaction may be more than a short-term effect. (Brown and Kamp, 2005).

Guski (2004) describes this change effect in a hypothetical model and also notes that where the noise situation is permanently changed, the annoyance of residents usually changes in a way that cannot be predicted by steady-state dose/response relationships. Most studies show an "over reaction" of the residents: with increasing noise levels, people are much more annoyed than would be predicted by steady-state curves, and, with a decrease of noise levels, people are much less annoyed. Guski also notes that the annoyance may change prematurely before the change of levels, with residents expecting an increase in noise levels reacting more annoyed, and residents expecting a decrease in noise levels less annoyed than would be predicted in the steady-state condition….

[**COER Comment:** Step change is very relevant to Growler noise at OLFC, which while intermittent, is frequent. Under the preferred alternative (Scenario A) there would be about 100 to 175 days of Growler practice at OLFC averaging about 2-3 hours per fly day[2], or about 17% to 25% of the 12 fly-day hours of operation (noon to midnight). As recognized in the EIS (page A1-41), "*annoyance can cause stress, and prolonged stress is known to be a contributor to a number of health disorders, such as hypertension, myocardial infarction (heart attack), cardiovascular disease, and stroke (Munzel et al., 2014).*" Kryter and Poza (1980), found that noise-related ill-health effects are probably largely due to the psychological annoyance from the noise interfering with normal everyday behavior. These studies addressing step change and frequency/intermittency show a strong relationship of jet noise to ill-health and that this effect is likely to be magnified at OLFC because of the extreme step difference between ambient noise levels and flyover noise and because of the intermittency. The Navy, however, while citing the studies opted to consider them insufficient to advance an impact on those exposed.]

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[2] At 24,500 operations per year and 125 days of OLFC flying, there would be on average 196 operations per fly day. At 196 operations divided by 2.25 minutes per full FCLP circle or 2 operations = 87 minutes x 2 = 174 minutes per fly day or 2.9 hours.

#10 **Pages M-38 and M-39:** Per recommendations from public comment letters, the Navy reviewed the referenced literature submitted by the WADOH and USEPA and other public comments, and took an extensive look at the best available science; a summation of those journal articles has been added to Appendix A1…. Based on the Navy's extensive literature review and qualitative analysis of impacts using best available science and long-standing government and industry standards, the Navy believes it has the information it requires to assess potential impacts from the Proposed Action.

[COER: That sounds very nice—that the Navy has all the information it needs to "*assess the potential impacts*" of jet noise on nonauditory health. In prior sentences, however, the Navy says it would be too "*speculative*" to conclude anything about the effects of aircraft noise on health. How does that work? We have the information we need, but we're not going to use it? Basically what the EIS has said is that it can't do any analysis on the nonauditory health impacts because the studies are too confusing to figure out. All the more reason for the EIS to rely on the best available expert source, WHO, and adopt their conclusion of heath risks from aircraft noise, as presented above.

Furthermore, COER does not agree that "long-standing government and industry standards" equate in import with the best available science. Government and industry standards that are long-standing is hardly a reason to proclaim the standards are scientifically efficacious. Indeed, the longer and older the standards have stood, the greater the likelihood they do not comport with current science. Instead, it is quite likely they are mired in bureaucratic gridlock and lethargy related to resistance to change. For example, there is irrefutable scientific evidence that guns kill people, but there is no bureaucratic consensus on what to do about it.

Finally, someone needs to explain to Congress, that they fund the Navy's Hearing Conservation Program, but that Navy has apparently concluded the program is unnecessary or at least be put on funding hold until more definitive information becomes available. That program requires routine health monitoring for Navy personnel exposed to high noise levels and removes pregnant women from working in hazardous noise zones. If there is no noise-health risk, then the Navy would surely have sense enough to spare the taxpayers the expense of that costly program. The existence of that Program, however, reflects the Navy's belief in current scientific evidence of noise-health risks and a need to protect personnel from unhealthy noise, even including those or higher risk groups.

Unsurprisingly, the State of Washington has also recognized the health link to noise and promulgated similar worker protection regulations for those routinely exposed to loud noise: https://www.lni.wa.gov/safety/rules/chapter/817/WAC296-817.PDF .

Finally, it is widely accepted that stress creates a health impact and increased risk of health maladies. The EIS correctly notes that aircraft noise (worse than highway or rail noise) creates high annoyance, which in turn increases stress-based reactions on the autonomic, cardiac, and peripheral nervous systems that regulate all body functions. This is central to the WHO findings and to the related governmental/military noise protection programs related to toxic noise. The EIS denial of a Growler noise-health relationship and noise exposure risks does not achieve NEPA expectations for forthright, credible, and professional use of the best available science.