Analysis of the Navy's
NDAA Noise Monitoring Technical Report[1]

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The 2020/21 NDAA Navy "real-time" Noise Monitoring study failed to live up to the Congressional intention to provide reliable research on the growing military jet noise crisis in Northwest Washington State and fully inform agencies and communities of the impacts from jet noise. The objectives were not satisfied, the results were incomplete and tainted by questionable procedures both in the design of the study and in the reports.

The key issue regarding the Navy contractor's Technical Report[2] is how the noise data was analyzed and presented. It was also about averaging short bursts of extremely loud jet noise mixed with hours of quiet. The DoD misused the FAA averaging standard, which is meant for measuring highly frequent civilian airport noise, NOT highly intermittent noise. Among other significant weaknesses in the report are the use of the dBA noise scale, which excludes much of Growler noise, and the use of an outdated DNL threshold that is based on erroneous studies from decades ago and has been debunked by acoustic experts from around the world. They have concluded 55 dBA, not 65dBA, is the actual threshold that should be employed (see Fidell Analysis of DEIS). Hence, a DNL of 85 dBA, as recorded at the Reuble Farmstead, was 30 dBA over the threshold, which equates to 8 times louder than the threshold.

1. Congressional Intent Undermined

The Technical Report listed three objectives:

(1) Documenting the monitored sound levels;
(2) Assessing the accuracy of DoD military aircraft noise models via comparisons with the monitored sound levels at NAS Whidbey Island and NAS Lemoore; and
(3) Recommending improvements to the noise modeling process.

As such, the study was to reveal how much noise, how loud, and how often; it was not a study simply to validate prior noise modeling (objectives 2 and 3). Yet the Navy's final Technical Report focused heavily on model validation. Results related to actual flyover noise (objective 1) were glaringly inadequate and possibly misleading. Even their attempt to validate modeling (objective 3) revealed serious questions.

Obviously, Congress intended the results to be complete and accepted as credible, reliable, and honest. To accomplish that required blinding the study, yet oddly, the Navy made no attempt to incorporate community input insisting on blinding. That would have ensured trust and reliability in the flyover data. Instead, the Navy facilitated pilot knowledge of monitor locations and the dates that monitors would be recording.

[1] This technical review was prepared for the Sound Defense Alliance Legislative Committee by member group Citizens of the Ebey's Reserve for a Healthy, Safe & Peaceful Environment.

[2] Blue Ridge Research and Consulting, LLC, March 2021 "Naval Aircraft Sound Monitoring Study: Monitoring Plan."

Despite Congressional intent that the study be transparent and fully released to the public, it was only after the Technical Report was released and after a Freedom of Information Act (FOIA) lawsuit was filed, that the Navy finally released the study's implementation planning documents in March 2022[3]. Reviewing the Technical Report in conjunction with the plan documents shows that the Navy failed to fully implement the contractor's original study plan, which included analysis of standard noise metrics the Technical Report never addressed.

2. Shortcomings of the Implementation Plan

2.1—Site Selection

Because the focus of the study was to be the impact of military jet noise on identified communities, the Navy was supposed to consult with these communities in identifying the locations to be monitored. As explained in **Appendix A**, the sites selected for noise monitoring (1) discounted community input on site selection, (2) were in some cases relatively obscure and insignificant sites to the exclusion of far more important sites, and (3) were not the sites analyzed in the EIS and therefore could not be directly compared with the EIS modeled noise.

In the absence of any explanation, let alone a cogent one, the sites selected raise legitimate question over the possible agenda behind those selections.

2.2—Navy Rejected Blinding the Study

Local community leaders had stressed during pre-study community meetings with Navy personnel that the data collection must be "blind." In other words, Navy pilots should not be aware of the monitoring site locations or times. A blind study monitoring pilots of different skill levels would eliminate questions as to the reliability of the results.

This was a critical requisite because skilled pilots can reduce noise at the monitoring sites in a variety of ways, such as slightly decreasing the power setting when flying near a site or by effecting a slight path deviation away from the monitor. At low elevations (500 to 1500 feet) a very slight adjustment to either side of the monitoring site can significantly diminish noise levels (e.g., a ¼ mile shift from the site for a jet at 500 feet above ground could reduce the noise level by about 10 dBA, a reduction of one half of the loudness [see EIS Table 3.1-2]).

In looking at the planning documents, it is clear that the Navy's interest was to validate its modeling. To that end, the Navy's contractor actually asked for pilots to be assigned to this noise study who had previously participated in sound modeling studies (Kick-off Meeting

[3] All the FOIA documents are available at https://citizensofebeysreserve.com/lawsuits/documents/ and scroll down to the list under Freedom of Information Act (FOIA) Complaints—2022: March, FOIA Documents Released.

Notes).[4] The pilots to be monitored were cherry-picked! This fact alone makes all the monitoring data subject to doubt.

3. Shortcomings of the Navy's Report

3.1—Use of Day-Night Noise Level (DNL)

Instead of reporting on how loud and frequent noise exposure was (the intent of the NDAA legislation), 95% of the report focused on validating the Navy's DNL modeling.
The day-night noise level (DNL) metric is known to be an inadequate and problematic metric originally intended to represent the human annoyance response to noise. Unfortunately, it too easily misrepresents noise annoyance and, as such, can be easily misused to disguise the real impacts from noise. As employed by the Navy, their DNLs averaged quiet times with noisy times, which hid actual annoyance reactions, i.e., what people actually hear and find tolerable or intolerable. Noise experts have accordingly refuted the usefulness of DNLs, yet the Navy continues to use that metric because it downplays the actual real-time jet noise impacts.

More egregiously, the Navy continues to use an outdated 40-year-old DNL threshold (i.e., 65 dBA) to denote significant community annoyance. That same 65 DNL has been discredited by the international scientific community. Acoustic experts from around the world have concluded 55 dB is the actual threshold (Fidell Analysis of DEIS). Congress needs to bring its use of DNL metric up to world standards when examining military jet noise over civilian populations.

3.2—Missing Metrics

The contractor's original study plan obtained through FOIA promised to employ metrics the Technical Report never addressed (Contractor's Original Plan, see Sections 6.1.2 and 6.1.3). Five noise metrics were to be collected—L_{max}, SEL, DNL, Number of Events Above, and Event Durations—and reporting was to include averages and variation of those metrics. That would have been acceptable had that essential information made it into the final report, but other than DNL, the other metrics were dropped or inadequately reported (see next section).

The contractor had also intended to use "NoiseCheck" (see Sections 6.2.1 and 6.2.2), which is a procedure "developed by the Air Force Research laboratory to check the consistency between monitored and modeled data." Use of NoiseCheck was not mentioned in the final report, and presumably was not employed.

[4] Aircraft Sound Monitoring Study Project Kick-off Meeting Notes, Next Steps, page 2 which states:
"Action – [The contractor] will develop a data **validation** package and will work remotely with installations/air crews on collecting operations data.
For better efficiency and consistency, **BRRC recommends coordinating with pilots who have worked with noise modelers on prior NEPA or AICUZ studies**." [Emphasis added.]

3.3—Measured Loudness Inadequately Reported

The monitored real-time or measured noise levels of Growler overflights are a function of the loudness of each individual noise event. The Navy Report devotes 16 pages to comparing modeled to measured DNLs (pages 53 to 69), but its analysis of individual flyover noise is limited to only 2 short paragraphs and 1 graph. Even that analysis used only a single metric, sound exposure level (SEL); it should have included at least the maximum noise level (L_{max}). And it presents the SEL data graphically in a statistical format, which for most of the public is difficult to interpret. No tabular presentation was attempted at all.

More outrageously, the individual noise event graphs are limited to just two sites, both Oak Harbor (Ault Field) sites, albeit two other Oak Harbor sites are buried in an Appendix D. No SEL or other individual flyover data or analysis is presented for any of the five OLF sites. However, significant impacts at the Coupeville OLF have been well-documented by JGL Acoustics.

At the OLF sites, the Navy recorded a total of 33 sessions (total, 2762 operations, 1881 overflights), so it collected a lot of useful individual event data. Surprisingly, none of it was presented in the Report. By comparison, JGL Acoustics recorded Growler noise at the OLF across 33 sessions in June and July 2019 (JGL, 2019), 5 sessions in February 2016 (JGL, 2016), and 5 sessions in May 2013 (JGL, 2013). And, JGL recorded at 11 discrete stations, whereas the Navy recorded at just 5 stations. Furthermore, JGL's three studies devote 123 pages primarily to analysis of loudness (SEL, L_{max}, and L_{peak}) compared with the Navy's Sound Report's 22 pages.

JGL's robust real-time, single-event data strongly indicate Growler noise events are louder than the Navy's modeling predicts and at levels that are extremely disruptive. As JGL notes in its report for just the 2019 noise events:

> *In that short period of time, residents in the [OLF] area were exposed to over 29 hours of military jet noise involving over 1,000 overflights, 769 of which exceeded a maximum sound level of 100 dBA.*

And the JGL results show the Navy's Final EIS-modeled SEL and L_{max} estimates were considerably lower than the JGL real-time results (Real-Time vs Modeled Growler Noise at OLF). The Navy was fully aware of all the JGL reports, yet its analysis explicitly avoided any comparative analysis from its monitoring. Had it done so, it probably would have revealed that modeling for the OLF underestimated the actual noise.

The Navy's analysis of the Ault Field sites points to the modeling overstating the real-time or measured noise. The analysis, however, is highly inadequate:

- First, the median SELs at the two graphed Ault Field sites (Figure 54, page 81) are about 20-30 decibels less than relatively comparable sites JGL recorded at the OLF. That equates to a fourfold to eightfold difference in loudness.
- The data used in that graph are not explained. It could be all data, a given week of data, or a mix of randomly selected or cherry-picked data. Second, it is not clear

whether it is measuring just Growler flights or a mix of aircraft (if the latter, it could lower the median noise levels, depending on the mix).

- Third, the two graphs depict only arrival data for the NASWI gate site and only departure data for the Seaplane site.
- Fourth, the real-time SEL data were not compared with the closest POI projections in the Navy's Final EIS. So the two graphs are uninformative and possibly misleading.

The Report includes more graphs in Appendix D (pages D-2 to D-5), but those graphs provide no greater clarity. While the graphs examine measured versus modeled SEL data for the four Ault Field sites, they do so for just a sample of all the recorded flights.

Each of the eight graphs is based on a flight profile identifier that provides no useful information to the readers, making it impossible to know what days were involved and where the recorded flights were relative to the site. This makes it is impossible to determine whether the eight selected cases were representative or not at all.

What the graphs do show in ALL eight cases and in Figure 54 is that the median SELs for the real time data were generally less than the modeled data. If the Navy wants to establish trust in those findings, it must credibly analyze all the data, rather than a selected portion.

3.4—Modeled-to-Measured Individual Noise Events Not Compared

Even more perplexing and unsatisfactory, the Technical Report made no comparisons of the FEIS-modeled individual noise events to the Sound Study's real-time measured data. Therefore, the only modeled-to-measured data compared were for DNLs, and even those comparisons were inadequately presented. Only one site in the FEIS was also a monitoring site in the Sound Study, Reuble Farm, but even for this site, no comparison was made to reveal whether the individual noise event modeling for that site was accurate.

The contractor collected a wide swath of individual noise event data and had planned to analyze it, as is clearly evident in meeting records obtained through FOIA. So it is troubling that no modeled-to-measured individual noise event comparisons were presented in the report. This also speaks to the arcane and dubious site selection decisions discussed in Appendix A.

3.5—Modeled DNLs in Sound Study Are Suspect

The Navy's Study presents both modeled and measured real-time DNLs for its monitored sites and claims that the modeled data were taken from the Growler EIS (e.g., footnote *a* in Table 12, page 56). The EIS, however, presented no modeled DNLs for any specific sites. The EIS did present DNL contour bands that envelop the monitoring sites, but those 5-dB contour bands are not site-specific. Therefore, any site-specific modeled DNL must have been computed AFTER the final EIS was published, and most likely was done specifically for the NDAA Study Report. That opens the door to questioning the efficacy of those newly modeled DNLs because each would be an inappropriate post hoc computation.

For Example: *At the Reuble Farm the real-time measured DNL was 84.3 dB and the EIS "previously modeled" DNL was 80.1 dB (Technical Report, Table 12). The EIS contour bands, however, show Reuble Farm was in either the 65-69 DNL band or 70-74 DNL band (Figure 4.2-13, Alternative 2A), so how the contractor derived it to be 80.1 dB is remarkable.*

Given the EIS DNL at about 65 to 74 dB for Reuble Farm, the 80.1 value differs from the EIS by 6.1 to 15.1 dB. This is a major difference and a large understatement of the modeled noise. How the "previously modeled" DNL ended up being 80.1 dB is disturbing and unexplained. If the previously calculated DNL can be that far off, then what does it say about the accuracy and reliability of the EIS contour bands? Or if the previously calculated DNL is an error and the EIS contour bands are correct, that would mean a huge modeling understatement of the actual noise.

3.6—Olympic National Park Findings Questionable

At the Hoh visitor center in the Olympic National Park the Navy concluded: "*The [DNL] data collected are consistent with the previously modeled results.... [And the] resulting military aircraft are not a significant contributor to the sound levels [there].*"

Given that Growler overflights would occur over very brief periods creating loud noise readings that would be overwhelmed by the balance of the day's very quiet periods, the DNL average for the day would be expected to be very close to what it would have been with no jets flying. Furthermore, a spectogram in the report shows that almost all of the noise recorded at the Hoh Rain Forest Visitor Center was below 1000 Hz, (the Growler received its nickname for this low-frequency noise). This noise does not register on A-weighted (dBA) recordings. Hence, the dBA noise levels reported at Hoh do not fully reflect and inform as to the total Growler noise experienced by visitors. Given the data averaging and the A-scale truncation of noise, the Navy's conclusion above is misleading and conceals the true level of visitor impact.

If that was not bad enough, unrevealed too is how loud and frequent Growler overflights are on a day of flying. And the difference between the inactive quiet time (ambient noise level) and the individual noise events is essential to understanding how noise negatively impacts the visitor experience. An actual flyover may be 70 to 90 or even 100 dB, per Navy data. That means overflights may be 100 or more times louder than the predominant background noise level. And, the Navy EIS estimates 3,116 annual flights (2,227 total flight hours) over the Olympic practice area. The EIS documents that a Growler at 10,000 feet above the ground, 85% power, is 75 dB at 1 mile either side of the jet path (FEIS, page 3-6, Table 3.1-2) and ground on the Peninsula can be 4000 ft above sea level.

Appendix A:
Site Selection Shortcomings

The contractor and the Navy selected the sites to be monitored. Local leaders did submit site lists, but nearly all of their candidate sites were dismissed. Two of the five OLF sites the

Navy selected nearly overlapped—Perry House and Water Tower—making them inexplicably redundant. Neither of those sites had been recommended by local leaders, probably because they were both in a very low-impact (low-population) areas.

Several of the sites community leaders recommended were sites in heavily populated Admirals Cove neighborhood, where jet noise complaints are a regular occurrence. One Admirals Cove site (Admirals Drive/Byrd) did make in on the Alternative Site list but was rejected by the Navy, who argued that Perry House would produce similar noise levels. We question that judgment because the Navy knew that Perry House would be about 10-20 dB SEL less (2-4 times less loud) than the Admirals/Byrd site, which had the added benefit of being actually modeled as a Point of Interest site in the EIS. And it was a good mile from, rather than on top of, the Water Tower site (i.e., not redundant). One can only conclude, the Navy really did not want actual noise data for well-populated Admirals Cove, where complaints about noise are a regular occurrence.

Additionally the Navy did not include Coupeville's high/middle schools on the alternative consideration list, even though citizen groups and local leaders had specifically requested that for monitoring. Instead, the Navy felt it was important to monitor the isolated and overlapping Water Tower and Perry sites.

Still more disturbing was that one of the site-selection criteria actually eliminated sites that had adjacent noise reflection surfaces, like walls of buildings that would bounce the jet noise around. Most of the people impacted live, for the most part, in neighborhoods where there are many noise reflective structures, like houses, barns and businesses. So, if the noise the residents experience is exacerbated by reflection and bounce-back, then that is the real-time noise that they experience and should have been included—not excluded.

Adding to overall incoherence of the Study, only 1 of the 12 monitoring sites was a Point of Interest (POI) in the Growler EIS; that was Reuble Farm. The EIS presented modeled estimates of individual noise event data at 18 park, 10 school, and 20 private residence POIs; the modeled data at those 48 sites included the number of exceedances of 80, 90, and 100 dB as well as numbers of speech interferences and classroom interruptions, etc. As one objective for the Navy's Sound Study was to validate their EIS modeling, why did the Navy go out of its way to select non-EIS, non-modeled sites for real-time noise monitoring?