Reducing Underwater Noise through Underwater Noise Management Plans

Comments by the Wildlife Conservation Society Canada

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These comments are in response to Transport Canada’s January 2019 Technical Discussion Paper Reducing Underwater Vessel Noise through Underwater Noise Management Plans. They address questions posed in that paper, preceded by general comments about the overall approach as well as factors to be considered when adapting a national approach to Arctic circumstances.

Summary of key recommendations

1. Underwater Noise Management Plans need to be specifically developed for Arctic circumstances. There’s an opportunity for proactive planning in the Arctic, where anthropogenic noise levels are low compared with other oceans but where increasing ship traffic will therefore have a relatively high impact. Anthropogenic noise thresholds should therefore be lower in the Arctic. However, this also means that Arctic-specific UNMPs can be developed with the aim of preventing anthropogenic noise from becoming a serious issue in the first place, rather than simply mitigating an existing problem.

2. Fleet-level approaches do not supplant the need for other measures. Regional restrictions are aimed at minimizing impact in particularly sensitive areas, and maximum noise limits on individual vessels address the specific impacts caused by particularly noisy ships. These measures are important, and fleet-level measures that lower overall fleet volume profiles don’t address these issues.

3. Underwater Noise Management Plans should allow for regular review and improvement. Our understanding of noise and its impacts is continuing to evolve, and therefore any UNMP program – and the UNMPs themselves – will need to be subject to regular review and continual refinement. The shipping industry, the scientific community and regulators should wherever possible be working together in a collaborative manner to ensure that research addresses priority needs, and that research findings are incorporated into the UNMPs on an ongoing basis.
About Wildlife Conservation Society Canada

WCS Canada’s (www.wcscanada.org) mission is to save wildlife and wild places in Canada through science, conservation action, and inspiring people to value nature. Our trademark is “muddy boots” biology, which we do by getting in the field and conducting the necessary research to fill key information gaps on Canada’s fish, wildlife, and ecosystems. We then use relevant information and our expertise, working with Government and regulatory agencies, conservation groups, indigenous communities and industry, to resolve key conservation issues.

WCS Canada is a national affiliate of the Wildlife Conservation Society, which has been working in the Arctic since 2002, with the Arctic Beringia program formally established in 2011. Our work in the Canadian Arctic has focused to a large extent on what can be learned from passive monitoring of the acoustic environment of Arctic waters; gathering information on the activities of marine mammals, fish and ships, and the impact of ship traffic on the behaviour of the wildlife, and using that knowledge to model impacts and the efficacy of mitigation measures.

Limitations of a fleet-level approach

As described in the Technical Discussion Paper, Underwater Noise Management Plans (UNMPs) are intended to be developed at the fleet level, and not for individual vessels. Three approaches are proposed: 1) defining fleet-level mitigation measures; 2) setting fleet-level noise reduction targets; or 3) creating a points-based system. In our responses below to the questions posed by the discussion paper, we consider and respond to these options, but at the outset we’d like to highlight a significant shortcoming of fleet-based approaches to mitigating underwater noise. Fleet-level plans can, if they are effective, reduce the overall average noise levels, while giving flexibility to fleet operators to determine how best to achieve these reductions. However, without there also being maximum noise limits set there remains a risk that individual ships might continue to emit noise at dangerous levels. When it comes to localized impacts, peak noise from individual vessels can be particularly harmful, even when overall average noise levels across an entire fleet are reduced. Therefore, it will be important to accompany any fleet-level UNMPs with defined maximum peak noise volumes for individual vessels. In other words, whichever target or points-based system is ultimately adopted, it’ll be important to supplement that guidance with specific mitigation measures aimed at keeping peak noise volumes below defined thresholds.

Arctic circumstances

Circumstances in the Arctic Ocean differ notably from those in Canada’s other oceans, and this distinction should be reflected in the way UNMP guidance is developed and implemented. Overall ship traffic is significantly lower than in other oceans, and the peak traffic areas are considerably less heavily used than high-traffic areas in other coastal regions. This might suggest that the challenge of managing underwater noise is of a lesser level of concern. This would be a mistake however, since underwater noise from shipping in the Arctic is projected to rise in the coming decades. In absolute terms, the Arctic is likely to remain quieter than many regions around the world where anthropogenic activity is particularly intense. But the relative change may be dramatic. When ambient levels are low the introduction of anthropogenic noise will have a greater impact than in a region where the ambient levels are already high. What’s significant about this is that, for Arctic wildlife including marine
mammals, fishes and invertebrates, the relative increase in sound levels and/or new noise sources may result in behavioural impacts, even if the absolute volume remains lower than in noisier oceans.

Put most simply, Arctic wildlife are not acclimated to noisy environments and therefore may be disproportionately affected by even modest noise increases. Therefore, UNMPs should factor in both broad regional considerations (e.g. reflecting arctic circumstances) as well as specific targets geared to regions known to have particular concentrations of marine mammals.

There are other characteristics of the Arctic acoustic environment that are distinctive to or more prevalent in polar regions. There are noise sources that are particular to those areas, including natural noises caused by ice formation and break-up as well as anthropogenic noises emitted by ice breakers ramming into ice. Furthermore, sound propagates differently in Arctic waters. Sound can become trapped in the Arctic sound channel near the surface of the water and propagate over much greater distances at shallower depths than in non-Arctic waters. Perhaps most importantly, the culture and livelihoods of Indigenous peoples in the Arctic depend on the continued health of marine mammals to a greater degree than in other regions of the world. Noise impacts affecting the behaviour of these mammals and thus the ability of hunters to be successful will be immediately felt in these communities and therefore deserve proactive attention.

Moreover, experience gained in Atlantic and Pacific waters demonstrates that by the time noise levels reach the point where mitigation measures are being considered the impacts are already unacceptably high, and the “ratchet effect” makes it relatively difficult to move towards reduced noise levels. In the Arctic there’s an opportunity to implement proactive measures, but this will require an overall approach that puts a stronger emphasis on precautionary measures than would necessarily be feasible in other waters.

Our further comments below respond to the questions posed in the ‘Seeking Your Views’ sections of the discussion paper.

Section 3 Underwater Noise Management Plans

What should be the trigger for requesting or requiring development of a UNMP?
Any new routes or operational conditions should trigger a UNMP, especially if the route transits rich or biologically important areas.

3.2 Targeted Underwater Noise Reductions

Should fleet owners be responsible for setting individual targets in their plan?
The discussion paper outlines options in which targets are based on regional baselines, or all fleets reduce noise by a set amount. In neither of these cases would the fleet owner be responsible for setting a target. It’s not reasonable to expect fleet owners to understand the issue in sufficient detail to set their own targets.
A regional baseline may be logistically and technically easier to achieve than a fleet-based baseline. What advantages or disadvantages do you see for a system in which each organization’s contribution to achieving a regional goal differs?

A regional baseline is a necessary first step. However, in order to distribute responsibility for meeting a noise reduction target across multiple operators within a region it’ll be important to also develop fleet-based baselines. These data can be used to estimate the contribution of the fleet to the regional background noise level and will be important in determining priorities for reducing overall noise levels.

Should noise reduction targets be a number of decibels (broadband) or within a specific frequency range?

Noise reduction targets should be set for broadband noise levels (reducing general impact) as well as for specific frequencies, aimed at mitigating impacts on particular species of concern in a particular region. In addition to absolute noise levels, of particular concern regarding noise impact on animals is narrow-band acoustic energy (e.g. tonal peaks). This noise feature should be identified and prioritized for mitigation for each vessel type. These noise types are often much more audible at low levels and often cause strong reactions among animals, even at low levels. This is an important aspect of underwater noise impact that is not currently well understood. The important point to note is that noise disturbance is not always simply related to absolute noise level.

The science is definitely evolving which must be made clear to industry (in this case shipping) so that they do not interpret updates as “moving the goalposts”. An ideal scenario is for industry to be directly involved in the science through collaborations so that the details that are evolving are more clearly appreciated. The primary aspect of the science that is evolving is the understanding of animal impacts. As this evolves (as noted above), we often find that the absolute acoustic level (i.e. in decibels or dB) is not as important as other aspects of the noise (e.g. tonality, amplitude fluctuations, signal onset time, or biological salience). Of particular difficulty is understanding the relationship of signal salience (i.e. meaning; for example, does it sound like a predator) to impacts. The more frequently the criteria are updated, with industry as closely linked as possible, the better.

What advantages and disadvantages do you see in using a points-based system, which does not rely on hitting a set noise reduction target or measuring baselines in order to achieve noise reductions?

A points-based system would certainly be easier to implement, but it’s unlikely to be effective. Fleet operators will gravitate towards implementing the measures that achieve the required points with the least effort, but unless the point system is flawlessly calibrated (which is virtually impossible to do) those measures won’t result in proportionate noise reductions. Moreover, it will be very difficult to monitor the efficacy of such a system.

3.3 Target Groups

How should vessels be targeted for the development of UNMPs (e.g. by location, noise level, vessel size, class, fleet size)? Should UNMP requirements be the same for all groups?

Vessels should be targeted based on their contribution to overall noise levels, with supplementary criteria that would apply in areas where there are known concentrations of marine mammals. UNMP requirements should be adapted for specific vessel types, so that there are incentives to reduce noise
levels for all vessel types, more stringent reduction requirements for noisier vessels and absolute limits on peak volumes.

3.5.2 Baseline information
Baseline information should include acoustic source levels for each vessel and normal operating conditions (e.g. speed). This would be the responsibility of fleet owners, using commonly established criteria (size, engine/propeller type, etc.), and is needed in order to calculate a fleet baseline. This should be supplemented by background noise baselines for particular regions, which is used to set overall noise reduction targets.

3.6 UNMP review
Should UNMPs be made publicly available online, filed with Transport Canada, or kept by the business owner/operator?
As noted in the discussion paper, UNMPs will need to be reviewed by Transport Canada (which may use an accredited third party to carry this out on behalf of Transport Canada). It will, however, be important for these plans to be made available online, with whatever detail is appropriate. This transparency will allow for expert review to ensure that the measures are evidence-based and reflect evolving information about the issue. It will enhance the public relations benefit of these plans to fleet owners, and will hopefully encourage continual improvement within plans, as fleet owners review the UNMPs of other fleets and respond by making incremental improvements to their own plans.

4. Potential Underwater Noise Mitigation Measures
What resource materials are you aware of that could be useful as guidance in support of development of UNMPs?
Attached to this submission is a matrix of recommendations and guidelines on anthropogenic underwater noise, compiled by Emily Chou, Brandon Southall and Howard Rosenbaum for WCS, with information drawn from Inter-Governmental Organizations and associated conventions, from Governmental organizations and from selected best-practice publications for mitigating underwater noise.

Additional source material, which is of particular relevance to Arctic conditions:

5. Success Factors of Effective Management Systems
Are there other key factors of success related to the successful development and implementation of UNMPs?
Our understanding of noise and its impacts is continuing to evolve, and therefore any UNMP program – and the UNMPs themselves – will need to be subject to regular review and continual refinement. The shipping industry, the scientific community and regulators should wherever possible be working together in a collaborative manner to ensure that research addresses priority needs, and that research findings are incorporated into the UNMPs on an ongoing basis.

We welcome the opportunity to comment on this discussion paper and look forward to continued collaboration on this important issue.

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