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[Municipal and regional assessment of “quiet areas” in Sweden](#)

Posted: 21 Jan 2019 12:33 AM PST

A [new paper from Sweden](#) presents a compelling overview of efforts made by regions and municipalities in that country to identify areas that are relatively free of human noise. While these efforts have had only modest impact on planning and regulation, in a few cases quiet areas are being protected from noisy development or highlighted in recreational promotion. This sort of initiative deserves to be more widely replicated.

Any local planners or activists who would like to encourage quiet-area expansion and protection will find a wealth of references here, and will appreciate the case reports describing some of the criteria being used in various cities, towns, and counties. The paper is open-access and can be [readily downloaded](#) as a PDF or html.

The authors found that 41% of Swedish municipalities include quiet areas in their general plans (all shades of green on map at left), but only 6% (dark green) have created detailed assessments or strategies for

implementation.

Here's an example of a map produced by the city of Hörby, where the local general plan "includes a detailed account of how the quiet areas are to be protected. For instance, wind farms, shooting ranges, sawmills, and similar activities are to be avoided." Other towns have also aimed to concentrate noisy activities away from currently quieter areas.

The authors examined ten regional initiatives and forty-three municipal projects in some detail, including looking at the criteria used for classifying various degrees of "quiet area," which generally ranged from very quiet rural settings (25-35dBA) to parks in urban areas with noise levels that were relatively modest compared to the surrounding neighborhoods (perhaps 45dBA, with varying standards for times above this level based on local context).

Since 2013, three municipalities have replicated a Stockholm initiative, a local "Guide to Silence," the most active outreach thus far undertaken, which emphasizes accessibility and the publication of maps, guides, and signs at quiet locations. Relatedly, three coastal Swedish counties have pioneered "Consideration Areas," where visitors are encouraged to minimize their noise in designated archipelagos, for example by slowing boats and avoiding noisy activities. While having no legal force, reports indicate that collaboration and common goodwill have made these efforts quite successful.

Still, the authors note that "in many cases where mapping of quiet areas had been performed, it has been used mainly as an inventory," with little or no followup in the ten or fifteen years since the initial mapping. Clearly, there is much more than can be done to move these ideas forward and establish relative quiet as a resource that is worth protecting and expanding. This paper is a very useful starting point for learning more about the possibilities and potentials of quiet area planning.

As a final bit of inspiration, here's a map of European "potential quiet areas," which highlights the pressing need to identify and protect what quiet places remain, especially in and around developed areas. You can click on this map to view a larger version that gives a better sense of the many tiny pockets that deserve our attention ASAP; while the US, [mapping by the National Park Service](#) finds similarly tenuous pockets

of quiet in federal, state, and local public lands that should be prioritized for protection.

[Whale earwax ties 150 years of stress changes to whaling, wars, and climate](#)

Posted: 12 Dec 2018 07:55 AM PST

A [fascinating new study](#) sheds light on changing stress levels in baleen whales over the course of the past 150 years. Earwax from fin, humpback, and blue whales accumulates over their lifetimes, a bit like tree rings, and the researchers were able to track cortisol levels by sampling the layers in earwax plugs from museum collections. This study averaged the results from 20 whales; the researchers are now [beginning their analysis of over a hundred new samples](#).

The takeaway is pretty striking: stress levels track well with increasing whaling activity through the early and mid 20th century (blue line below), and dropped dramatically when commercial whaling ended. In the midst of that span, a lull in whaling was countered by military actions during WWII, which seems associated with a smaller spike in stress. And while stress remained low from the 70s through the 90s, it appears to be rising again in the past couple of decades; the researchers suggest that rising sea temperatures are the most closely associated factor in this recent spike, with other anthropogenic factors including shipping noise also likely contributing.

A couple of caveats are in order. Most importantly, this study had only 6 earwax samples that extended past the year 2000, so recent trends may be distorted by the small sample size; the spike in 1995-2000 represents just four whales, and the final plot points include two fin whales that lived only a couple of years (interestingly, their stress loads were low, so the recent dip may be particularly uncertain).

Not surprisingly, there were notable differences between species and a

marked variability over the course of individual whales' lives that did not track with global trends in nearly so striking a way. Here is a particular whale that suggests increased stress in particular years (including a possible WWII encounter), but which appears less affected by the global whaling trends, perhaps reflecting where it lived:

All this is really quite exciting, though. We can look forward to much more robust results as this sort of analysis is expanded to more whales, and to other hormonal markers. It's also possible that as samples from whales that died more recently are included, regional trends related to increased shipping noise may begin to become apparent. At the same time, this is a good reminder that as much as we like to focus on acoustic factors, the stressors affecting modern whale populations are many, with climate and prey availability being especially pronounced.

[Cue the lawyers: NOAA approves five Atlantic seismic surveys](#)

Posted: 01 Dec 2018 11:40 PM PST

NOAA [has issued Incidental Harassment Authorizations](#) to five oil and gas exploration companies, each of which plans to engage in several weeks to several months worth of surveys off the US Atlantic coast during the one-year permit period, which extends through 2019. When the Trump administration initially announced its rollback of the Obama-era decision to forego new exploration, it seemed that the lack of Atlantic leasing opportunities in the 2017-2022 National Outer Continental Shelf Oil and Gas Leasing Program would undermine the economic incentives to invest in new surveys (and AEI wrote [a detailed "don't worry too much" post](#)).

But the Trump team threw out years of agency staff and scientist work and is now rewriting the OCS leasing program three years early: their new Draft 2019-2024 plan opens up six lease areas in the Atlantic in 2020, 2022, and 2024; new surveys will guide both the government and oil companies as they identify which areas are ripe for development.

However, it is inevitable that court challenges from environmental groups and perhaps coastal states will slow the process down or derail it

completely. So stay tuned....

The surveys being proposed are broad-brush preliminary overviews of the region, and so involve somewhat less intense sound-blasting than detailed site-specific surveys; most of the tracklines are 20-30km apart, and some 100-200km apart, though one survey narrows the spacing to 6km in the core area (see center, below). But they cover vast areas of the sea, on and beyond the continental shelf. Here are sample maps showing the survey lines being proposed:

Most of the activity is well offshore, which helps minimize impacts; from November through April they are pushed a full 90km offshore to keep high levels of noise out of North Atlantic Right whale winter breeding and nursing areas; several other smaller areas are off limits either year-round or seasonally.

[Behavioral impact estimates](#) are surprisingly low (and so perhaps a target of legal challenge): under a dozen right, sei, and blue whales, and a few thousand behavioral changes among far more numerous fin and sperm whales; sea turtles are expected to take the biggest hit, especially in far offshore sargassum habitat, with tens of thousands being disrupted and thousands experiencing temporary hearing reductions.

All this region-wide noisemaking, of course, in service of the madness that is continued oil and gas development in the face of a global climate imperative to leave untapped reserves in the ground. The US is already the world leader in oil and gas production and we have thousands of existing leases that have yet to be developed; the last thing we need is more straws in the ground—especially in deep offshore waters. I have to admit, though, that I am no longer as sanguine about the Trumpistas' offshore crusade as I was when these plans were first floated a year ago.

UPDATE, 12/14: For those of you wanting to raise your voice about this, you can count on our compatriots at [Ocean Conservation Research](#) to keep you updated on the field of play for public discourse.

[Court adds new hurdles for BC oil sands pipeline as](#)

[separate lawsuit calls for emergency orca protections](#)

Posted: 13 Nov 2018 11:57 AM PST

Over the past decade, plans for a big expansion of the Trans Mountain pipeline in British Columbia have garnered pushback from ocean advocates. In late 2016, the plan gained its final approval from the Canadian government ([see AEI coverage](#)), but in late August, a Federal Appeals Court [overturned that approval](#), citing the government's failure to assess the effects of increased shipping on the dwindling orca population and shortcomings in consultations with First Nations.

Chief Bob Chamberlin, vice president of the Union of British Columbia Indian Chiefs, [called the ruling](#) “a major win with impacts that will be felt across the country....Our wild salmon and the orcas that they support are critically under threat. The increased tanker traffic that the ... project proposes is entirely unacceptable.”

However, Jonathan Wilkinson, the Minister of Fisheries and Oceans, remains confident that the court's concerns can be addressed. While acknowledging that the government is still being [guided by the courts about what level of consultation](#) with First Nations is required, he was confident that the concerns about orca populations have been addressed by the government's “very robust” [Whales Action Plan](#), which includes limits on the chinook salmon fishery, ship-slowing measures, and moving shipping lanes somewhat further away from key orca feeding areas, saying that “the work the court was looking for has already been done.”

Wilkinson stresses that the increased tanker traffic—350 tankers per year, or 700 transits—is a modest addition to the 3500 other large vessels (container ships and ferries) that ply the waters of this region; [he notes that](#) “If we are going to recover the southern resident killer whale, we need to take action that will mitigate noise from all of those sources, not simply six or seven tankers coming out of the terminal every week.”

Still, “they have a lot of work to do now to see if there are ways to lessen or avoid those impacts under the Species at Risk Act,” [said Misty Macduffee, a biologist with the Rainforest Conservation Foundation](#). “The Salish Sea is already too noisy for killer whales, so any traffic you add to it makes a bad situation worse.”

Given the precarious state of the local resident population, you can be sure that government regulators will have their feet held to the fire as this longtime controversy continues. The government has not yet announced whether it will appeal the recent ruling to the Supreme Court, or send the concerns back to the National Energy Board to address the shortcomings highlighted by the Appeals Court.

Indeed, less than a week after the Appeals Court decision, and on the very same day, the government proposed an [expansion of orca critical habitat](#), while a consortium of environmental groups [filed suit in an attempt to force the government to issue emergency protections](#) in the face of the orcas' ongoing population declines.

“Emergency orders are specifically designed for circumstances like this, when you have a species that needs more than delayed plans and half-measures to survive and recover,” Christianne Wilhelmson, executive director of the Georgia Strait Alliance, [said in a written statement](#). Last year, the previous

“I have to say, personally, I was very disappointed in the action that was taken by the environmental organizations,” [said Wilkinson, the fisheries and ocean minister](#). “They were the ones who initially asked to convene the multi-stakeholder forum. They effectively attended one meeting and then decided that they would pursue a more adversarial approach rather than a collaborative approach.”

Wilhelmson said the groups were prepared to work with government. “But the process that they set up was all about talking, not about action,” she said. “It was clear that this was just another process that was going to take months and months and months — and the orcas don’t have that.”

[Slowdowns could reduce noise impacts of increased Arctic shipping](#)

Posted: 13 Nov 2018 09:36 AM PST

Several recent studies highlight the heightened risks of increased Arctic shipping, along with some opportunities to minimize the effects of shipping noise on specific Arctic species and populations.

With the retreat of sea ice, both the Northwest Passage (along Canada's northern coast) and the Northern Sea Route (along Russia's northern coast) are seeing increases in commercial and fishing vessel traffic. While the first [cruise ship](#) crossed the Northwest Passage in 2016, Russia's [Northern Sea Route](#) is the current center of activity, with both [container ships](#) and LNG (natural gas) [tankers](#) making pioneering transits without icebreakers over the past two summers. Total ship numbers are still modest, as it's not yet cheaper than the longer route through the Suez canal, but these test runs are explicitly intended to chart the course for rapid increases in the coming years; Russia [aims to ship 80 million tons of cargo by 2024](#), up from 10 million tons in 2017 and 2018, and China is moving rapidly to implement a "[Polar Silk Road](#)" initiative to encourage companies to build the infrastructure necessary to ramp up this shortcut to European markets.

Two recent studies address key questions about the biological impact of increased shipping on Arctic ecosystems. The first, from researchers at the University of Washington and the University of Alaska at Fairbanks, examined the ranges of 80 localized subpopulations of seven key Arctic species, and found that just over half (42) of these would hear increased shipping noise. Of these, some species are more vulnerable than others:

"Narwhals have all the traits that make them vulnerable to vessel disturbances — they stick to really specific areas, they're pretty inflexible in where they spend the summer, they live in only about a quarter of the Arctic, and they're smack dab in the middle of shipping routes," [said co-author Kristin Laidre](#), a polar scientist at UW Applied Physics Laboratory's Polar Science Center. "They also rely on sound, and are notoriously skittish and sensitive to any kind of disturbance."

In addition to narwhals, beluga and bowhead whales and some subpopulations of walrus are likely to be vulnerable to increased noise; ringed and bearded seals, as well as polar bears, will be less vulnerable, thanks to widespread populations and spending much of the summer on land rather than in the water. In addition, the researchers stressed that [the Bering Strait is a key chokepoint for both Arctic sea routes](#), as well as being a crucial migratory corridor.

"I think we can learn a lot from areas that have already been thinking about these kinds of conflicts between ships and marine mammal populations — for example the North Atlantic right whale, or fin and blue

whales around California,” Laidre said. “We could aim to develop some mitigation strategies in the Arctic that help ships avoid key habitats, adjust their timing taking into account the migration of animals, make efforts to minimize sound disturbance, or in general help ships detect and deviate from animals.”

A second study took a different tack, looking at whether speed reductions (as implemented in some areas around busy ports) would reduce the noise impacts. They used an increasingly common metric, “listening space,” the area or volume of water within which an animal can hear its brethren, its prey, or other biologically important sounds. The researchers modeled ship noise in several key chokepoints on the Northwest Passage, calculating the distance over which vessels sounds would impact the listening space for several species, and at how much the effect could be moderated if the ships were slowed in key areas. And indeed, the [effects were significant](#):

Under quiet conditions, beluga whales experienced a 50 percent listening space loss when they were 7 to 14 kilometers (4.3 to 8.7 miles) away from a ship traveling at 25 knots. When ships slowed to 15 knots, whales could get as close as 2 to 4 kilometers before they experienced the same loss of listening space.

In other words, when a ship was going faster, the area over which it cut a beluga’s listening space in half might be more than three times larger. This difference is important because there are many places where whales cannot distance themselves from ships in the Arctic (in the narrow Prince of Wales Strait, animals can maintain a maximum distance of just 7 to 10 kilometers).

As always, the results are [not all as simple as that](#); the researchers found that for some species, the effects are less in certain weather conditions or for different kinds of ships (container vs. cruise), and that in some situations, the effects can actually cover a larger area when ambient noise is high (as it increasingly is with loss of ice cover). And, as always with vessel-slowing programs, planners must consider the tradeoffs between moderating the noise level and increasing the time during which ships are audible during slower passages.

With the inevitable increase in Arctic shipping, it will be crucial for both governmental and commercial players take steps to minimize the acoustic

impacts in these remote waters, among the last areas in the seas where human noise intrusions have been relatively modest.

[Don't get too worked up over Trump's splashy offshore oil talk](#)

Posted: 06 Jan 2018 08:53 AM PST

An AEI big-picture commentary

Once again, a Presidential announcement about offshore oil development has sent the media and environmental advocates into a spasm of headlines and press releases that presumes the words being uttered in DC actually reflect on-the-ground (or in this case, under-the-waves) reality. In late 2016, there was effusive praise for an effectively symbolic Obama decision to not offer leases in Alaskan and Atlantic waters (AEI's "[much ado about not much](#)" post questioned the prevailing celebratory outburst). Fourteen months later, we've got a mirror-image outcry over Trump's base-pumping proclamation about "[unleashing America's offshore oil and gas potential](#)" through a National Outer Continental Shelf (OCS) Oil and Gas Leasing Program for the years 2019-2024.

This one sure does *sound* bad: opening up 90 percent of our continental shelf, with 47 lease areas including regions like New England and the Pacific Northwest that haven't even had vague proposals for decades. Despite the boom in American oil and natural gas production that occurred during the Obama years, with much of the increased production being exported, the new administration is intent on exploiting as-yet untapped deposits, ignoring the climate imperative to leave as much oil in the ground as we can. Vincent DeVito, a Counselor for Energy Policy at the Department of Interior, practically twirls his mustache with this comment from the official DOI press release:

"By proposing to open up nearly the entire OCS for potential oil and gas exploration, the United States can advance the goal of moving from aspiring for energy independence to attaining energy dominance. This decision could bring unprecedented access to America's extensive offshore oil and gas resources and allows us to better compete with other oil-rich nations."

Sure, that's just the ticket; these eager beavers can't wait to dominate a fading industry—a decade from now, since that's how long it takes to get

offshore wells on line.

And so begins a two-year planning process that will needlessly and expensively repeat the one just completed in 2016. For we *already have* a National Outer Continental Shelf Oil and Gas Leasing Program, with a finalized plan set to run from 2017-2022, which the government (both federal and states), oil industry and energy consulting firms, and environmental groups spent two years and who knows how much money to complete. As always, these plans are revisited, revised, and occasionally overhauled every five years. But this gang may not be around in 2021-2022 when it'll actually be time to once again jump into this particular vat of no-fun-for-anyone. So let's just tear it up and do it all again now!

UPDATE, 2/16/18: Caroline Ailanthus [rightfully notes that diving back into processing hundreds of thousands of public comments and writing up a new programmatic EIS will keep BOEM staff from fulfilling their many other tasks](#), which include assessing new science and identifying key data gaps, smaller project-level environmental assessments, and overseeing new research. She asks, "Do you suppose interfering with research in this way could be the point of this massive do-over?"

But before we get too caught up with the swarm of freaked out bees in our bonnet, let's step back and consider the actual energy development landscape as it exists in the real world, as distinct from the fever dreams of this administration's oil and gas cheerleaders. Of course, we can start with the obvious global surge toward solar and wind energy and countless innovative projects aiming to radically improve batteries and foster other energy infrastructure breakthroughs, or the bipartisan opposition to opening up more of the OCS demonstrated during the same process two years ago, which [included more than 150 municipalities nationwide and 1,200 local, state, and federal officials](#), many of whom were presumably among the over 800,000 comments that were supposedly considered by Zinke and his team as they prepped this re-do. Already the Republican Governors of Florida and Maryland are [slamming](#) the new initiative and vowing to fight it.

UPDATE, 1/10/18: Well, that was quick. In response to Florida GOP Governor Rick Scott's outcry, DOI Secretary Ryan Zinke announced that his state will be [removed from offshore lease consideration](#), because, in Zinke's words, "Florida is unique and its coasts are heavily reliant on

tourism as an economic driver.” Well, that is exactly the position taken by nearly every other coastal governor, Democratic and Republican alike.
Stay tuned....

No, we don't even need to take solace in all this context; all we have to do is look at the current state of our “leashed” and woefully neglected oil and gas industry:

First off, when [announcing](#) the existing 2017-2022 OCS program, Bureau of Ocean Energy Management (BOEM) Director Abigail Hopper stressed that “The proposal makes available more than 70% of the economically recoverable resources, which is ample opportunity for oil and gas development to meet the nation’s energy needs.” Indeed: the 6% of the OCS currently being leased is more than enough.

Even this week’s opposite-world announcement from the current administration is proud to note that BOEM currently manages about *2,900 active OCS leases*, covering almost 15.3 million acres, while noting that this accounts for 18% of domestic oil production. Indeed, in July the US Energy Information Administration (EIA) bragged that Gulf of Mexico crude oil production is at [an all-time high](#), and will keep rising through 2018 (the extent of their short-term forecast). Eight new wells came online in 2016, with 7 more on tap to start flowing by the end of this year. It’s worth noting that this partly reflects a surge after a five-year lull in production growth after the Deepwater Horizon blowout triggered a temporary moratorium on new drilling permits; and taking a wider view, exploratory drilling and new production wells have been in steep decline since 2014, largely reflecting the [tapping out of the easier-to-access shelf areas](#); nearly all new development is in deep water. (Huh; any chance that all the the idle shelf-drilling equipment is behind some of the push for new shelf leases?)

Likewise, The Center for Energy Studies at LSU [released a report last spring](#) that saw nationwide crude oil production increasing 33% by 2023, and maintaining that high level through the end of its projection period in 2029, largely driven by a 45% increase in Gulf of Mexico production.

But new oil development is not just taking place in the Gulf: oil field spending nationwide is [set to rise 15% in 2018, to more than \\$100 billion](#), after a *47% increase in 2017*, [outpacing the international trends](#). (Wait, what? Not only is America already great, we’re also already dominant!) Notably, the [stated](#) limiting factor is not a

lack of reserves, but rather cash constraints as companies finance this surge. If so, how many companies are going to be eager to plow significantly more money into harder to develop offshore leases? (Especially considering the [7-10 year timeline](#) for getting a new offshore well online, even in the Gulf of Mexico where the leasing and permit process is far less of a public hot-button issue.)

One more straw for this wobbling camel's back: [less than half of existing, already purchased oil and gas leases are currently being explored or developed](#). As of the end of 2015—the last annual report available at the time the Trump team began banging the drum for [lifting the “burden”](#) on oil and gas companies—a record 7950 purchased leases were idle on federal land, while at the same time a record number of leases were in production and federal onshore oil production had increased 70% in the previous decade. If we really want to continue spewing carbon into the atmosphere, we can do it without heading out to sea.

We surely can, considering the recent discoveries on shore, all of which are much easier to permit and develop. As one of those [fantastically in-depth New Yorker pieces](#) recently reported:

In September, 2016, the Apache Corporation, a Houston-based oil-and-gas-exploration company, announced the discovery of a new field in the Permian Basin, called Alpine High, which is estimated to contain seventy-five trillion cubic feet of gas and three billion barrels of oil. Two months after the Alpine High discovery was announced, the U.S. Geological Survey revealed that another area within the Permian, the Wolfcamp shale, likely contains twenty billion barrels of oil. The agency called the deposit “the largest estimated continuous oil accumulation . . . assessed in the United States to date.” Wolfcamp is also thought to have sixteen trillion cubic feet of natural gas. **Between 2007 and 2012, assessments of how much recoverable oil remained in the Permian Basin increased by more than eight hundred per cent.**

And speaking of US energy dominance, not even considering the long-shunned offshore territory Trump is so eager to “unleash”:

Rystad Energy, an oil-and-gas consultancy, estimates that, **for the first time in history, the U.S. holds more oil reserves than either Saudi Arabia or Russia**. More than half of the U.S. total is embedded in shale. Technological advances have decreased the cost of fracking to the point that it is becoming competitive with traditional means of extraction.

Production in the Permian Basin has doubled in the past five years, to two million barrels a day, and the break-even cost of a fracked well in the region has plummeted to as low as twenty-five dollars a barrel. *This has had dramatic consequences for more expensive means of production, such as coal-tar extraction and ocean drilling.* (Emphasis added; i.e., the easier-to-recover onshore deposits are even more likely to attract investment, before companies go fishing for offshore reserves.)

Taking all these little-known facts into account, perhaps the specter of vast new oil fields along nearly the entire US coast is not nearly as scary as we might at first presume.

UPDATE, 1/10/18: [WaPo notes one reason](#) that oil companies may prefer to develop new offshore leases rather than existing onshore ones: it can be cheaper to export oil and gas from offshore wells, since they don't have to build controversial pipelines to get their raw material to refineries along the coast.

UPDATE, 2/9/18: Here's [another good look at the many hurdles](#) standing in the way of implementing Trump's rush to develop offshore waters, focusing especially on the many avenues of state leverage to slow or stop the process.

But that's not the only rollback of Obama-era decisions that the Trumpistas announced this week: they also announced a proposed rule that would [abolish safety regulations added after the Deepwater Horizon blowout](#). This one may have more potential to come to fruition, depending on how strict the rule-making process is about hewing to best available science and technology. The [2016 regulations](#) tightened controls on blowout preventers (the key equipment that failed in 2010's disaster), as well as the design and lining of wells, and included a provision requiring real-time monitoring of subsea drilling and spill containment equipment. These sorts of safety measures should be considered all the more crucial as Gulf of Mexico development moves off the continental shelf and increasingly into [extremely deep waters](#); 3000-7000 feet is routine, with some [pushing 10,000 feet](#), and that's before continuing through the seabed for another 10-20,000 feet to the oil and gas reservoirs.

UPDATE, 2/3/18: Not surprisingly, the administrations rush to reject Obama-era policies is often neglecting established legal frameworks for making and changing regulations. This NYT article suggests that some of

the [environmental rollbacks could fare poorly during court challenges](#).

Even the oil industry is concerned:□

“Privately, oil executives who are pleased with Mr. Trump’s desire to strip away regulations have expressed frustration at the Interior Department’s methods, worrying that they could bog down the efforts in a legal morass.

‘What’s important is, let’s step back and go back to regular order, and let the process run its course,’ said Jack Gerard, head of the American Petroleum Institute, which lobbies on behalf of oil companies.”

In response to the new regulatory provisions, the oil industry cried that the cost of complying with these safety measures would cripple offshore development, tossing around scary numbers that resurfaced [in news reports](#) this week as economic justification for the rollbacks: the “flawed and costly” “unnecessary burdens” would result in a reduction of \$45 billion in industry capital spending on new wells over ten years, and the loss of 50,000 jobs. But look closer at the [American Petroleum Institute’s talking points from 2015](#), which began the spread of these numbers (and added the prospect of US GDP taking a \$27 billion hit over ten years). These figures, if they came to pass, would amount to a 10% reduction in capital investments in the Gulf of Mexico, an 11% reduction in total employment in the industry there, and a possible 15% reduction in regional oil and gas production—though the 2017 projections of Gulf of Mexico production cited above, both of which came out *after* the rules took effect, clearly call the API claims into question. And that GDP hit? Again, IF it this ghost of economic impact becomes real, the annual \$2.7 billion touted is a drop in the GDP bucket; the most recent reported GDP is \$19.5 trillion.

I don’t know about you, but I’d stomach a one-hundredth of one percent drop in GDP—as well our globally dominant US oil boom being 10% smaller—in order to make another Deepwater Horizon SNAFU a bit less likely. (See Ocean Conservation Research’s scathing commentary on [the nickels and dimes that the oil industry is clawing back from consumers and the earth](#), via their minions in the Trump administration.)

Of course, all these “reassuring” factoids about our thriving oil and gas industry does nothing to ease my angst about the elephant in the atmosphere. I present them here not to champion the heedless rush to burn all we can before it’s too late, but to shed some light on what those inside the industry are working with as they consider the risks and rewards of

moving into new offshore regions. As they look ahead a decade or more, it's hard to imagine there'll be all that many oilmen ready to throw their gold dollars into the oceanic wishing well.

However, there is at least some chance that these 47 offshore lease areas may loosen some purse strings enough to take advantage one of Trump's earlier moves, which opened the door to new seismic surveys on some of the Atlantic continental shelf. Those plans led to much gnashing of teeth among enviros, though [industry insiders doubted](#) there'd be many, or perhaps any, takers unless leasing was on the horizon.

{In case you're wondering, those surveys are the initial noise-producing activity that turns my acoustic ecology ear to the issue of offshore oil and gas development, which also triggers increased ship noise from service vessels as well as sprawling subsea oil processing facilities that roar day and night for the decades of production. For another take on how all the Trumpian offshore shenanigans relate to acoustic issues, see [this summary from Ocean Conservation Research](#), which addresses several other odious proposals that I haven't touched on, and [this November 2018 OCR update](#).}

Still, if the seismic survey shoe drops, there may be at least some tentative oil industry toes dipped into the water, which could involve bidding on a few leases, whether or not they are ever likely to be developed—bidding on lease blocks is a cheap way to stake out a bit of ground, just in case. (A case in point is the [over 400 leased blocks that the oil and gas industry abandoned](#) in the Beaufort and Chukchi Seas between 2008 and 2016, as it became clear they would be too costly to pursue.)

Some of you may want to discourage such shoe-dropping and toe-dipping by adding your voices to the next batch of hundreds of thousands comments being submitted about this new boondoggle, which will include at least four comment opportunities. In addition to the Draft Proposed Program, which opens for comments on January 8, BOEM will soon initiate a Draft Programmatic Environmental Impact Statement, and after these, there will be a Proposed Final Program and a final PEIS to weigh in on. If you want to chime in, [here's the link to the National Program page](#). And once again, look to Ocean Conservation Research for an [impassioned call to submit comments and join public protest events](#) in coastal cities.

And that, I think it's safe to say, is "the rest of the story"—in all its

metaphor-mixing extravagance!

[More evidence of fish being affected by shipping, energy development noise](#)

Posted: 04 Jan 2018 04:02 AM PST

A couple of recent studies have added to the increasing evidence that anthropogenic ocean noise can have deleterious effects on fish. As the years go by, it's becoming clear that it's not just whales and dolphins that are struggling with human noise in the sea.

A lab-based [study of European sea bass](#) found that recordings of pile driving sounds (often associated with bridge, port, or wind farm construction) and of drilling sounds triggered [subtle yet troubling changes in behavior](#). The sudden bursts of pile driving induced a startle response, while both kinds of sounds increased stress, as measured by the fishes' respiration rate. In addition, both sources of human noise appeared to suppress their normal predator inspection behavior, which could make them more susceptible to predation (though after a half hour of drilling noise, the bass returned to normal anti-predator behavior).

Ilaria Spiga, a doctoral candidate at Newcastle University and the lead author of the study, [explained](#), "Exposure to underwater noises can make it harder for fishes to detect and react to predators. . . If fishes actively avoid areas where these sounds are present it could prevent them from entering spawning grounds, or affect communication between individuals."

The question of communication was at the heart of a new study from the same team that has been [investigating how shipping noise can reduce the communication space of whales](#). The new research, led by Jenni Stanley, [focuses on two key commercial fish, cod and haddock](#). Utilizing the network of bottom-mounted hydrophones that they've deployed in Massachusetts Bay for the past decade, the researchers recorded the grunts of cod and the "knocks" of haddock, along with the noise of ships in the area. The most striking effect was the difference in noise levels between the cod's winter spawning site near the Boston shipping lanes and their spring spawning site near the fishing fleets of Cape Ann, north of Boston. While there were many more boats near the spring site, these

smaller vessels resulted in overall sound levels 11-15dB lower than at the winter site, which in turn allowed the cod to maintain dramatically larger communication space. (The distances over which cod could be heard were not measured directly, but rather calculated based on the source levels of their grunts and the prevailing levels of ship noise.)

At the quieter spring sites, the mean communication distance was 15 meters (below 11m during the noisiest 10% of the time, and over 19m at the quietest 10% of times), while in the winter sites, they could only be heard out to 2.7 meters (with 10% extremes of under 2.1m and over 3.4m at the very best of times). The haddock spawning sites had intermediate noise levels, and at their loudest could be heard at slightly longer range than the winter cod, though a weaker form of their call had the shortest range of any of those assessed.

The authors note ([see full paper here](#)):

Mounting evidence suggests that acoustic communication can affect the survival and reproductive success of fishes, including direct evidence for Atlantic cod. . . . Unlike haddock who have a wide acoustic repertoire, Atlantic cod are thought to be less versatile vocalists during courtship. . . . If anthropogenic sound reduces the efficiency of the vocalizations utilized by these species, this interference could potentially impact their reproductive success and survival through the incorrect assessment of the quality of potential mates or competitors, reduction in the ability to attract mates and/or the mistiming of gamete release.

While stressing that we still have much to learn about how fish may compensate for noise (by using other cues to find each other, vocalizing during quieter moments, increasing the intensity of their sounds, etc.), the authors conclude:

This research highlights the need to gain a better understanding of the spatial and temporal use of unique habitats that are predictably used for critical life history events in declining populations. Identifying and better understanding these consequences [at all levels of the food chain] is important to advancing the management of shared acoustic space.

[BC ship-quieting study stymied by lack of orcas](#)

Posted: 04 Jan 2018 12:29 AM PST

Last fall's [innovative 2-month voluntary slow-down of ships](#) traveling to and from the Port of Vancouver was successful on one count—average overall shipping noise was reduced by 44%—but a stark absence of the normally abundant resident orcas stymied the equally important second line of inquiry: how would reducing the noise level, but spreading more moderate noise over longer time periods, affect orca behavior?

About 60 percent of the ships transiting Haro Strait complied with the voluntary speed restrictions; even this level of participation succeeded in reducing the overall level of ship noise by 2.5 decibels, very close to the 3dB target set by the International Whaling Commission a decade ago. Thanks to the logarithmic scale of decibel measurements, a 3dB reduction amounts to cutting the sound energy in half. This is great news, a real-world confirmation that the noise of global shipping can be reduced relatively easily—albeit by increasing transit time.

It's this element that marine mammal experts remain uncertain about. Slower ships remain audible for longer during their passage, though at a lower volume; perhaps worse, the quiet periods between the passage of large ships became notably shorter and noisier, thanks to the lingering presence of ships in the mid-distance. What is more livable: a constant lower noise level or trading off louder periods for interims with relatively little noise? As researcher Scott Veirs [notes](#). "I'm not sure which I would prefer, but we definitely don't know which the whales prefer."

[An excellent in-depth article](#) on the Seattle nonprofit news site Crosscut tells the tale of the researchers waiting on shore to monitor whale behavior. But rather than seeing whales on most days, there were no orcas at all during the first month of the slowdown, and only six appearances in the second month. A stark lack of salmon kept the orcas out of the area; [salmon shortages are the primary factor](#) driving the decline in the Southern Resident orca population. A [recent modeling study](#) by a diverse group of researchers suggested that increasing salmon numbers by 15% while also reducing shipping noise by half would allow the resident population to recover. (The decrease in salmon numbers is [compounded by a boom in populations of seals and sea lions](#), who also eat salmon.)

The Crosscut piece zeroes in on the questions facing British Columbia, where [new oil and gas ports](#) and expansion of existing pipelines could [add](#)

[even more ships](#) to the mix:

Piloting his 31-foot research boat Wishart back to Seattle from the San Juan Island study site, Rob Williams mused on his 20 years studying killer whales. “A whole lot of science has been done already,” he said. It may be time to start making some difficult policy decisions about vessel noise, Williams said, and that means weighing safety issues and economic tradeoffs alongside concern for the whales. A number of factors, including the Canadian government’s approval of Kinder Morgan’s pipeline to export oil to Asia, could [drive future increases](#) in Port of Vancouver vessel traffic.

“What we have to do next is to have some really uncomfortable conversations. . . about how much of this acoustic space do we think it is fair to ask the whales to give up.” Williams said. “And how much are we willing to give up to have killer whales persist?”

“And those aren’t science questions,” he continued. “They are really tough value judgments.”

[Australia launches world’s first continent-spanning acoustic observatory](#)

Posted: 11 Dec 2017 12:40 PM PST

The burgeoning field of soundscape ecology (also dubbed ecoacoustics) is poised to take a remarkable leap forward during the just-beginning Australian summer of 2018. By mid-year, researchers plan to install 400 microphones in 100 locations spanning the continent’s seven diverse ecoregions.

At each location in this Australian Acoustic Observatory (A2O), two acoustic recorders will be placed in relatively wet habitats for that biome (wetland, river, creek, drainage, depression) and two in relatively dry areas. Every six months or so, researchers will swap out the SD cards at each location and upload all the files to the [project website](#), where everyone can engage with this extraordinary dataset.

David Watson, one of the Chief Investigators, noted [in an introductory article](#):

One of the strengths of this project is our ability to use sound to picture time. We can prepare fascinating visualisations that contain months' worth of data in a single image.

Some of the effects we're measuring, such as the impact of cane toads and other invasive species, have very obvious acoustic signatures. They are dramatic to hear, but even more striking to see in a sonograph (essentially a graph of sound).

We've pioneered the use of [false-colour spectrograms](#) to visualise [long duration recordings](#). These make clear the flattening effect of invasive species, or the long-term subtle shifts caused by climate change.

You absolutely want to check out those two links he provides! The first is to a short article containing an interactive 24-hr spectrogram which plays several minutes from each of three different times of day; the second is a thorough project description that was shared at conferences when they were in the pilot phase last year, and includes a deeper look at their innovative approach to spectrograms and the types of information they expect to glean in various habitats. It all promises to be a fascinating and exciting step forward for soundscape ecology.

[Oysters and scallops: no ears, but they still hate loud ocean noises](#)

Posted: 30 Nov 2017 10:15 AM PST

A recent line of research ups the ante on how widespread the impacts of human noise in the ocean may be. Oysters appear to [suddenly and dramatically close up in response to low frequency noise](#) at intensities that are relatively common—beginning at sound as levels as low as 120dB, and ramping up rapidly above 140dB. The figure at left shows how fast the shells closed at top and the degree of closing at bottom (from the minimal to maximal responses observed). Effects were strongest from 10-200Hz, a frequency range that includes shipping and seismic survey sounds.

While oysters, like many other shellfish and crustaceans, do not have ears, they are sensitive to vibrations; earlier oyster studies speculate that they may be responding to subtle seabed vibrations, though it's also possible

their tissues are responding to water-borne particle motion. [Another recent paper](#) looked at scallop behavior and mortality after exposure to airguns, and reports that negative effects were seen for months after exposure:

“Exposure to seismic signals was found to significantly increase mortality, particularly over a chronic (months postexposure) time scale, though not beyond naturally occurring rates of mortality. Exposure did not elicit energetically expensive behaviors, but scallops showed significant changes in behavioral patterns during exposure, through a reduction in classic behaviors and demonstration of a nonclassic “flinch” response to air gun signals. ... Hemolymph (blood analog) physiology showed a compromised capacity for homeostasis and potential immunodeficiency, ... with effects observed over acute (hours to days) and chronic (months) scales. ... Given the scope of physiological disruption, we conclude that seismic exposure can harm scallops.”

As our colleagues at [Ocean Conservation stress in their coverage](#) of these new developments, all this is part of a rapidly expanding awareness of the ways that our noise compromises ocean life far beyond the whales and dolphins that were the focus of initial concern and research. Early this year saw the publication of a [comprehensive review of the potential impacts of marine seismic surveys on fish & invertebrates](#). The authors point out that on many topics (fish catch rates, startle responses, tissue damage) results have been mixed/contradictory, with some studies finding negative impacts and others finding no response; their paper lays out key areas for future research that could begin to clarify these ambiguities.

The authors of a 2016 study on the [effects of shipping and construction noise on lobsters and clams](#) paint the picture quite clearly:

[Tim Leighton](#), Professor of Ultrasonics and Underwater Acoustics and study co-author, said: “There has been much discussion over the last decade of the extent to which whales, dolphins and fish stocks, might be disturbed by the sounds from shipping, windfarms and their construction, seismic exploration etc. However, one set of ocean denizens has until now been ignored, and unlike these other classes, they cannot easily move away from loud man-made sound sources. These are the bottom feeders, such as crabs, shellfish and invertebrates similar to the ones in our study, which are crucial to healthy and commercially successful oceans because

they form the bottom of the food chain.” Co-author [Dr Chris Hauton](#), Associate Professor in Invertebrate Ecophysiology and Immune Function, added: “I think these findings raise the prospect that anthropogenic sounds in the marine environment are impacting marine invertebrate species in ways that have not been previously anticipated.”

The Leighton and Hauton study, using sound playbacks mimicking a ship at 100 yards and wind farm construction at 60 yards, found that both lobsters and clams changed their digging behaviors, and triggered changes in their overall activity level (lobsters increased, clams decreased); they found no marked effects on brittlestar activity.

Clearly, we are still in the early stages of understanding how our noises may be changing ocean ecosystems. In addition, the recent review paper affirms a longstanding concern that noise may act as a synergistic stressor, making animals more susceptible to other known stressors such as food shortages or rising ocean temperatures, [noting](#) that “Single stressors related to sound exposure may show no effects in isolation but when combined with other stressors effects may become pronounced.” New study designs are beginning to tease out these inter-relationships, giving researchers and ocean managers new tools that can move both science and policy forward in constructive ways.

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