Call with North Dakota DEQ and EPA to discuss ND's fish and water sampling plan in connection with the proposed adoption of EPA's 2016 selenium criterion - February 17, 2021

Attendees: NDDEQ: Aaron Larson, Joe Nett, Jim Quamstrom, Todd Ussatis, Pete Wax, Joshua Wert
EPA HQ: Joe Beaman, Erica Fleisig, Karen Kessler; EPA R8: Josh Baker, Andrew Todd, Holly Wirick

Following introductions, DEQ said that the purpose of the call was to make sure that the state collects the right data, follows the correct sampling protocol, and that their analytical procedures are appropriate. Sampling will begin summer through late fall, 2021. Fish, water samples, and other parameters will be collected in conjunction with the state's biological work. ND is on a five-year rotation, which includes the National Rivers and Streams Assessment. A minimum of 20 sites will be sampled each year. The data will be used to help the state develop its water column criterion for selenium.

Sampling will begin in Ecoregion 46, which represents about one-third of the state. While selenium is not an issue in this ecoregion, there are two areas in the state – in the northeastern corner and the southwestern part – with geological formations that are exposed with naturally-occurring clays that contain selenium. When there are precipitation events in these areas, selenium levels increase. ND will collect samples from these sites as they sample other ecoregions.

The timing of sampling was discussed. EPA said if whole fish are collected, NDDEQ should avoid spawning periods and sample either a month before or a month after the fish are done spawning because that can affect selenium levels in the females. Spawning period variability among species was discussed.

Water quality samples will be collected in conjunction with fish sampling and tissue collection. Regarding the species to be targeted for analysis, EPA said the two elements to consider when looking at what fish would be appropriate to sample for selenium are sensitivity and bioaccumulation potential. The species that are more benthic-feeding and invertebrate-feeding tend to have higher exposure to selenium. One approach is to capture everything you have and look at the range of selenium you're seeing and select the ones with the greatest selenium concentration. Another approach could be to use a more targeted list and collect more samples of those targeted species which would give you a better estimate of variability at each site and a better estimate of what those concentrations are in the population.

DEQ said they could do a modification of both approaches. They asked EPA if ND knew which species are most likely to be bioaccumulators, would it be more appropriate to take multiple samples, or to take multiple collections of the bioaccumulators and sort them out by size to have more samples of that particular species?

EPA said the more samples, the better the estimate of what the true concentration is in the population at each site. Depending on the species available at each site and their bioaccumulation potential (e.g., insectivores vs. omnivores), if the state can capture a larger number of fish, they'll have a more robust estimate with a larger composite. If they don't capture a lot of fish, they'll have smaller composites. Knowing ahead of time what species they're likely to get will enable DEQ to focus its sample collection for selenium analysis based on what they have; ideally having enough samples of one species so that they'll have a robust estimate not only of the average concentration but hopefully, a little of the variabilities.

DEQ said they'll provide EPA the list of fish they collected in previous investigations in Ecoregion 46. EPA will review the list, look at diets, and help prioritize the list for analysis. DEQ asked, based on what was collected previously in Ecoregion 46, if they don't have high enough densities for some of the species when sampling – they may only catch two to four. If they don't meet that 50 – 100, or 20 grams for their sample, shall they pull another species?

EPA said if ND only has two to four individuals from a species, and if it was one of the highly desirable species, they'd recommend creating a sample with those fish. While it would be ideal to have multiple composites per species, if they can only do one then do one, and then collect other species.

The discussion turned to proper analytical methods for fish and water samples. DEQ asked whether the fish need to be homogenized in the field, if they need to be frozen right away, if the fish can go to the lab on ice and then prepared and frozen, and whether there is a time frame for that. EPA said they believe fish can be iced in the field and then brought into the lab, but suggests the state talk specifically with labs. EPA said they will check in with staff in their office who do a lot of sampling and will get back to ND on what their field methods are. They also mentioned EPA Region 10's recent work with Montana on sample preparation analysis which can be shared with ND.

ND asked EPA what would be a better selenium analysis for the water, dissolved or total recoverable, and what would be a minimum or a maximum for a detection level in order to be able to draw the kind of relationships that they need? EPA recommends dissolved, as the criterion as written now is a dissolved value for the water. In terms of a detection limit, as low as is feasible. The state will want to make sure they're capturing actual values even for those sites that have very low selenium concentrations.

QA/QC was discussed. ND's plan is to visit 20 sites with two repeats and collect five composites at each site. Assuming 10% or 12% QA/QC samples, they'd round-up to 127 samples. EPA said starting off with five composites is a good place to start and suggested that ND check old data to see if they indicate high variability at the sampling sites. If not, they'll probably be fine.

The discussion turned to collection of fish from lakes, which ND said will have larger animals because they're stocked with game fish. DEQ asked EPA whether a whole fish is better than a fillet. EPA said they've seen that a whole fish provides a more accurate representation of selenium bioaccumulation in fish. "Whole fish" (e.g., a 3 or 4 lb walleye) means to take representative subsamples of different tissues, weigh them, then weigh them against whole body weight, then calculate concentrations. When taking whole fish, it's important to take the liver because it is the site of selenium detoxification and metabolism in the fish. EPA said they can get back to ND on protocols.

EPA asked if the lakes where the state has some bigger game species are mostly stocked or if ND has natural reproduction of the bigger species. They pointed out that ND will want to target species that have natural reproduction in the lake rather than stocked fish, as they don't want to sample a fish that was just put into that lake because it's not going to give the state a good representation of how selenium has been incorporated into that fish if it's only been there for a short period of time.

DEQ said there's little natural recruitment, but they can probably look at data from Game and Fish which has done some studies from stocking on what the producers are, what those fish are consuming, and possibly get some age and size ranges. If there is a lake where DEQ knows there is some natural recruitment, they said they might be sampling some fish that might have been stocked. They asked EPA

if there is a certain age or class they should be focusing on, or as they're sampling, if they know an 8" walleye or bigger is going to be perfect, should they only net those fish and bring them in the boat? EPA said while there's no magic number, the best guess is at least 1-3 years of age, and that ND should certainly collect the larger fish that have been in the lake for a little bit longer.

DEQ asked, for those larger species for the target per composite, would EPA still recommend five even though the state will likely be way over the weight? EPA said if ND is focusing on one species and they have a lot of species, they'll get a better idea of the variability of the selenium if multiple small composites are taken versus a couple of larger composites that may dilute out the variability within a composite.

As the call adjourned, EPA said they're happy to take a look at QAPPs and other documents to give ND as much feedback as possible.

ND WQS Call Notes 2172021 re Selenium Sampling