Albemarle-Pamlico National Estuary Partnership
Aquatic Fauna Monitoring & Assessment Team

WebEx Meeting
10:30am – 12:00pm
April 18, 2018

Meeting Notes by Tim Ellis

Participants:

Wilson Laney (USFWS, Team Lead)
Brian Boutin (TNC)
Erin Fleckenstein (NCCF)
Dean Carpenter (APNEP)
Tim Ellis (APNEP)
Jimmy Johnson (APNEP)

Agenda/Notes:

The purpose of this meeting was to discuss the current list of aquatic fauna indicators and associated metrics in the context of a two-tier categorization:

- Tier I (consensus or near-consensus that the metric is a core aquatic fauna indicator)
- Tier II (mixed support or more research required).

10:38 AM - Meeting started.

Dean noted that we have a low turnout for today's meeting. APNEP staff will follow-up with team members who are not present to determine if there was miscommunication or scheduling conflicts that arose.

Dean gave a brief overview of the Monitoring & Assessment Teams' activities in 2017, including the kickoff meeting for this Aquatic Fauna MAT in early October. At that meeting, the team reviewed and made changes to the Phase-I aquatic fauna indicators and associated metrics. Shortly thereafter, APNEP provided a general guidance document to the MATs. In mid-December, Wilson, Dean, and Tim had a planning meeting to review the outcomes of the team's October meeting and to determine the next steps for this Aquatic Fauna MAT. In early March 2018, the STAC met and reviewed all Phase-II indicators that the MATs are currently working on.

Dean noted that from here on out, we plan to have bimonthly webinars with each MAT that will occur in between the normal biannual in-person meetings. Dean also clarified the roles of the APNEP MATs versus the Action Teams, particularly how the work of this team to develop and

track ecological indicators will help determine if CCMP actions are making a difference for aquatic fauna in the A-P estuarine system.

Dean explained that the goal of today's meeting is to review this team's current list of indicators and determine which ones fall under a category of Tier 1 or Tier II (as defined at the start of the notes). Dean asked if there were any questions and there were none.

Wilson noted that he had intended to populate a table to help facilitate the discussion but was unable to complete that prior to the meeting. He suggests instead that the team go down the list to determine Tier-I or Tier-II categorization, and then look to assign team members as lead for each indicator.

Toxicants in species

Wilson suggested that determining if this is Tier I or II depends on the level of monitoring being done by the state. Dean noted that having high-quality data should be the main criterion for Tier I but that it doesn't have to be the only criterion. For example, if the team determines that a particular indicator is important but that data are limited, then a monitoring strategy can be developed to begin acquiring the necessary data. Dean also noted that when we begin to assign team members as "champions" for a particular metric, that person doesn't necessarily have to be an author, although that would be preferable, but is the lead on finding the appropriate author(s) for the assessment, as well as which parties are critical to a long-term monitoring strategy.

Wilson suggests that *Mercury in species (TBD) tissues* be Tier I and *Dioxin in fish tissue* be Tier II. He noted that dioxins are mostly associated with areas of the A-P watershed that are impacted by paper mills, while mercury is more pervasive.

Brian noted that the dioxin consumption advisory is from the Highway 17 bridge in Williamston all the way down the Roanoke River and to the mouth of Albemarle Sound. He also noted that mercury has a broader impact given the number of sources for how it enters the system, but there seems to be more of a concerted effort to deal with dioxins than what is currently being done with mercury.

Wilson asked who oversaw the monitoring of mercury. There was some discussion amongst the team but further research is required to determine which state agencies are involved and the quality of the data being collected.

Erin noted that at the last STAC meeting there was some discussion about making sure that the indicators we select are manageable in terms of long-term monitoring. Since we are discussing indicators for an ecosystem outcome that *fish and game are safe for human consumption*, she wanted to know if any consideration was being given towards the activities of the other MATs, such as indicators associated with an outcome that *waters are safe for personal contact*, etc. She noted that much is being done with

regards to monitoring water quality in shellfishing waters, and perhaps there are other indicators besides *toxicants in species* that would effectively monitor multiple ecosystem outcomes. For example, Vibrio or bacteria concentrations in shellfish may be a better choice of indicator since it addresses both the *safe for human consumption* and *safe for personal contact* outcomes.

Wilson noted that shellfish consumption was discussed at the last meeting, but the thinking then was that mercury impacts were more widespread, affecting most aquatic fauna in the ecosystem, whereas Vibrio primarily impacts oysters.

Brian also noted that the conversation then centered on "toxicants", but he agreed that pathogens could be added as indicator here as well.

Pathogens in species was added as a new indicator, but as a Tier II given that current monitoring of Vibrio is limited. Brian noted that this indicator ties in well with conversations by the NCCF Oyster Steering Committee regarding the NC Shellfish Sanitation Program and potential to reopen a lab in the northern part of the state.

Dean asked if shellfish beds are closed due to the presence of pathogens.

Erin and Brian confirmed that this is done regularly by NC Shellfish Sanitation and is based on *E. coli* concentrations. Erin also noted that these data are readily available, which would support selecting this as an indicator. She also reiterated that by tracking bacteria concentrations in the water, we can monitor two ecosystem outcomes with a single indicator. Wilson agreed.

Vibrio in shellfish and *fecal coliform bacteria* were added as two metrics for the new indicator *human pathogens in species*.

Tim brought up the list of indicators currently being considered by the Water Resources MAT, which showed that they are considering a *pathogens* indicator that includes *E. coli concentration* as a metric.

Erin noted that her point is not to have a half-hour conversation here about each metric, but for this team to think about focusing on indicators that will serve the needs of multiple MATs. Wilson agreed.

Herptofauna

Wilson noted that the NC Wildlife Resources Commission has a new management plan for American alligator that calls for regular monitoring. The species is also widely distributed throughout the A-P region. As such, he suggests that this metric is a Tier I. He also noted that the USFWS may be doing some additional monitoring at the National Wildlife Refuges; Wilson will have to confirm that and report back to the team. Wilson informed the team that Michelle Moorman and Wendy Stanton, both of USFWS, have

switched positions. Michelle is now the refuge inventory and monitoring biologist working out of Raleigh and Wendy will be the refuge biologist at Lake Mattamuskeet. Wilson suggests contacting Michelle about historical data, as well as new monitoring plans within the refuges for American alligator.

Wilson asked if everyone was okay with this species being a Tier 1.

Erin reiterated her concerns expressed earlier today and at the last STAC meeting regarding the need to simplify the list of indicators. She stated she feels very strongly about this and would prefer that the team select only one Herptofauna species as a Tier-I indicator.

Wilson agreed and stated that he thinks American alligator is a good choice, for the reasons he already gave.

Brian agreed with Erin's sentiment of the need to be more focused in how the indicators are selected. He also noted that for sea turtles, the only regular monitoring that is done is for nests and not for juvenile abundance in the sound. Plus, the movement of sea turtles in and out of the system makes them a weaker indicator of ecosystem health than a more resident species like American alligator.

Wilson noted that juvenile sea turtle interactions with the large-mesh gill net fishery in NC are monitored as required by the federal incidental take permit issued to the state. But he agrees with Brian and Erin to make it a Tier II.

Wilson noted that more information regarding the federal listing of Neuse River waterdog will be available in November. He also noted that he has had some discussions with Alvin Braswell (NCMNS) who advised him that he had reservations about the most recent Neuse River waterdog survey that was done. Alvin found the species in places the survey did not. Wilson will follow up more with Alvin, as well as Sarah McRae (USFWS) who coordinated that recent survey.

Wilson asked APNEP staff if it is the Tier-I indicators that we need finalized today for the upcoming EPA review.

Tim replied that we are past that point now, given that the review packet has already been submitted to the EPA. What is important for this review is that we demonstrate to the EPA that our MATs are making significant progress towards developing their core list of indicators and then developing long-term monitoring strategies for those indicators. Tim also noted that this Tier-I and Tier-II categorization is meant to be a systematic way of further refining our list of indicators, primarily by getting team consensus that the indicator is important and that there are high-quality data available for an assessment. That said, Tim clarified that a Tier-I classification today doesn't necessarily mean that a particular indicator must be included in the team's core list. Eventually, we will want the team to also prioritize these Tier-I indicators.

Aquatic Macroinvertebrates

Wilson noted that the *Invertebrate IBI index (freshwater)* should be a Tier I based on discussions at the last meeting, and the other metrics here should maybe be Tier II.

Tim reminded the group that this section was completely reworked during the last meeting by Eric Fleek (NCDWR). Since Eric isn't here today, Tim suggests that we revisit this section at the next meeting and/or through outside communication with Eric.

Wilson agreed and suggested that we still make *Invertebrate IBI index (freshwater)* a Tier-I metric now; we can confirm for this and the other metrics later with Eric.

Diadromous Fishes

Wilson noted that of the species that are listed, the most recent assessment is for Atlantic sturgeon (2017). There is routine monitoring for Atlantic sturgeon in Albemarle Sound by NCDMF through a fishery-independent gill net survey. Wilson suggests making Atlantic sturgeon a Tier I. Wilson also noted that American shad is closely monitored and will have an updated assessment in 2020. Blueback herring and alewife are undergoing a new status review by the National Marine Fisheries Service and that report will be available in January 2019. Wilson stated that American eel will not be coming up for reassessment for a while and noted that it may be problematic as an indicator due to its complicated life cycle and given that many factors outside the A-P estuarine system impact the status and abundance of this species. For striped bass, Wilson stated that NCDMF is currently working on a new assessment.

Wilson suggests making both *Atlantic sturgeon* and *striped bass (sub-regional: Albemarle Sound)* as Tier-I metrics.

Brian noted that because these two species are likely to inhabit similar areas, the team may not want to have them both as Tier-I metrics for *diadromous fishes* and instead may want to consider the existing monitoring programs in Albemarle Sound. For example, American shad (more so than river herring) are caught in the fishery-independent gill net surveys as well, and Brian wondered if selecting American shad as Tier I instead of striped bass would make better use of existing surveys.

Wilson agreed but clarified further that for striped bass and Atlantic sturgeon, he was thinking that the metric would track young-of-year production within the estuary and not focus necessarily on the older life stages. He noted that there is a juvenile abundance index (JAI) for striped bass going back to 1955. For American shad, Wilson noted that although there are data on annual spawning stock biomass for every river system within the A-P watershed, there is the issue of oceanic bycatch for this species that complicates its use as a metric. That said, Wilson acknowledge that NCDMF does have a JAI for American shad and NCWRC is also now collecting information on outmigrating juvenile shad, but at a less quantitative level than the JAI. He thinks the

team could also include American shad as a Tier-1 metric, but that further discussions are needed regarding which of the parameters that are monitored will be used as the metric.

Wilson recommends tabling further discussion on blueback herring and alewife until NMFS completes its status review of those species.

Brian reiterated that the Clupeid component of A-P system is certainly important enough for this team to consider these species as indicators of ecosystem health, so he agrees with Wilson and suggests keeping it on the list for further discussion later.

Tim asked if the team wishes to remove American eel from the list.

Wilson replied that there are excellent data on this species for the Roanoke River from a timeseries of the number of eels that are trapped and transported at the Roanoke Rapids dam. Although, he noted again that these data are not entirely reflective of what is going on in the Roanoke River since recruitment to the river from the ocean is a major factor.

Brian agreed and noted that Atlantic sturgeon are going to be indicative of how much riverine hardbottom is available to spawn on and if this changes overtime due to sea level rise. River herring species are more indicative of how much high-quality swamp forest habitat is available to spawn on. American eels are just traversing through the system. Brian stated that if there are sufficient data, Atlantic sturgeon and river herring would be very good indicators of ecosystem health, more so than the others that are listed.

Wilson noted that there will be an American eel symposium this year at the annual meeting of the American Fisheries Society; Tier-II metric for now.

Estuarine/Marine Fishes

Wilson noted that some researchers are mining the NCDMF fishery-independent data for analyses of species habitat use, presence/absence, abundance, etc. He provided an example of two recently-published papers by ECU and others that used such data to report on the use of Pamlico Sound by various species of shark.

Tim noted that all the species listed here as potential metrics have fishery management plans (FMP). Fishery-independent data is used in the stock assessments that guide the development and implementation of those FMPs. The challenge is selecting just one or two species that best represent the health of the ecosystem. For example, some of the species listed here only use the A-P system at a particular life stage, while others reside in the system throughout most of their life history.

Wilson suggested that spotted seatrout is the most estuarine dependent of the species listed and is the least affected by what is going on offshore, which is not the case for Atlantic croaker, spot, and red drum. If we must select one species, Wilson advocates for spotted seatrout.

Brian noted that spotted seatrout are impacted by cold-stun events, which may affect our ability to track other changes in the system if we use spotted seatrout as a metric.

Wilson agreed but added that it will be interesting to see if changing climate results in less cold-stun events.

Tim agreed with Brian and noted that a challenge with using any of these fisheries resource species as indicators is that there will be impacts to the population that are outside the scope of the actions of the APNEP CCMP, which primarily focuses on the habitat and water quality that support these species. So, whether its fishing mortality or natural mortality, like winterkill events, these fish indicators may end up reflecting more of what we can't address through the CCMP, such as harvest or severe weather events.

Wilson agreed but reiterated that if we must pick one species as a metric for this indicator, then spotted seatrout seems like the best choice.

The team agreed to make spotted seatrout as Tier I.

Striped mullet was left as a Tier II until we can have further discussion with Jason Rock regarding what type of monitoring is being done and which aspects of environmental quality are most important to this species.

The team elected to remove Atlantic croaker, spot, red drum, and other economically-important fishes from the list.

Freshwater Fishes

Wilson noted that more information regarding the federal listing of Carolina madtom will be available in November.

Wilson suggested making the *Fish IBI Index* a Tier I. The team agreed.

Bivalve Mollusks

Wilson asked if Eastern oyster *bed extent by density class* is still a good metric for the team to consider.

Brian stated that those data come from the NC bottom mapping program and in the 30 years of that program, they have still not completed mapping the entire state. It is unlikely that this program would generate data sufficient for us to track changes over time in oyster bed extent by density class.

Brian updated the team on recent news that TNC, along with NCSU and NCDMF, has received funding to develop a fishery-independent survey of oysters in NC. The survey will be divided into the subtidal and intertidal components, and methods will be developed to sample each of them. This will be a three-year project to not only develop the methodology but to also pilot the subtidal methodology within the Middle Grounds area to determine adequate sampling effort for desired statistical power in a population-level analysis (from local up to a statewide scale). The study will also examine discard mortality associated with the dredge fishery. The end goal is to provide NCDMF with the foundation to build the data (e.g., oyster extent, population abundance, discard mortality) necessary to eventually conduct a stock assessment for oysters.

Wilson asked if there is a recommended metric for oysters to use now.

Erin stated that wild harvest is currently what is being used, with the caveat that annual yield is influenced by fishing effort. Once TNC and others develop fishery-independent survey protocols, then we would want to transition to that metric/approach.

Wilson asked if NCDMF maintains separate data on wild harvest versus mariculture production. Erin replied that the two can be distinguished. Brian agreed that wild harvest is currently the best source of information on the status of oysters in NC.

Wilson asked if NCDMF collects information on spat settlement.

Brian stated that NCDMF does have a spat fall program that occurs in two places, through the oyster sanctuary program and an effort in Morehead City, although the latter has been done since 2011 or 2014.

Wilson noted that spat settlement is appealing to him as a metric because it is independent of the various economic aspects (e.g., demand, market price, etc.) that factor into wild harvest metrics.

Brian doesn't think the spat settlement dataset is sufficient for a comprehensive analysis.

Erin noted that as of 2016, NCDMF did update their sampling design and protocol to include 29 sampling locations on an annual basis, but these stations rotate. Brian added that the protocol is now being updated again.

Wilson stated that effective May 3rd, yellow lance mussel will be federally listed as a threatened species. Wilson will confirm with NCWRC and USFWS if additional monitoring will occur because of this listing.

Wilson noted that NCWRC will be discussing Tar River spinymussel augmentation at a meeting tomorrow, but since we have no one from NCWRC on the call today, we will have to discuss this species further later.

Wilson stated that dwarf wedgemussel is already listed as a federally endangered species. He noted that surveys on this species have been done in the past but he is unsure about current monitoring.

Wilson suggests that this team select one of these three species (yellow lance mussel, Tar River spinymussel, dwarf wedgemussel) to track, but wait to have that discussion when NCWRC is present and can provide more information.

Tim suggested that since we are almost out of time for today's meeting, we should quickly skim the list to identify any remaining indicators/metrics that the team members today feel comfortable discussing further. For any indicators/metrics that weren't discussed, Dean and Tim will reach out to the appropriate team members for further information and guidance.

Marine Mammals

Wilson stated that he had investigated bottlenose dolphin assessments prior to today's meeting and learned that there are two (northern and southern) resident inshore groups in NC. Wilson also had some preliminary discussions with NMFS who conducts that monitoring. Given the timeseries of assessments and the ongoing monitoring, Wilson suggests making bottlenose dolphin a Tier-I metric. The team agreed.

As an interesting aside, Wilson informed the team about a striped bass tag that was recently found in the stomach contents of a bottlenose dolphin that stranded on Ocracoke in 2004. The USFWS had tagged the striped bass in 2001 in the Potomac River and it was caught by an angler in 2003. The angler cut the external portion of the tag and released the fish; it was the internal anchor of the tag that was found in the bottlenose dolphin stomach, along with portions of the fish.

Erin expressed interest in talking to Wilson more about this for a potential NCCF Coastal Review Online article.

Crustaceans

Wilson asked if there was anything to gain by adding a crustacean indicator, especially since penaeid shrimp are an annual stock. He noted that blue crabs do live longer than a year and are monitored annually by NCDMF.

Tim stated that blue crabs were more closely tied to the estuarine environment than nearly all the species we have discussed thus far, with oysters and spotted seatrout being other species that are also indicative of overall health of the estuary.

Brian noted that blue crabs are also the largest fishery in NC.

Erin noted that blue crab is an indicator that will resonate well with the public because it is a species they care about.

Wilson mentioned a concern that there is a study linking blue crab biomass to bycatch in Pamlico Sound and noted that as previously discussed for other species, there are likely other (non-environmental) factors affecting blue crab populations, such as bycatch.

Jimmy noted that NCDMF is getting ready to announce that the blue crab stock is overfished and that overfishing is occurring, which will be a controversial issue.

Tim suggested that we just focus on the remaining indicators for CCMP Outcome 2B with the time that we have left.

Fish Condition Pattern

Wilson suggests making *unusual fish mortalities* a Tier-I metric. He noted that these data are available over a long time series for both fresh and estuarine waters, and are indicative of undesirable conditions within the ecosystem.

Habitat Condition

Wilson stated that the removal of Milburnie Dam has restored access to 14 miles of *Freshwater hard bottom habitat*. He noted, however, that these data are limited for the A-P system and would take considerable resources to use side-scan sonar for bottom habitat mapping in every river system. Wilson suggests removing this indicator/metric from the list. There was no objection from other team members that were present.

Fish Habitat

Wilson noted that *Anadromous fish spawning/nursery areas* are quantified and that there is a mechanism in place for the state to designate those areas; however, until sufficient surveys exist to provide information on the use of these areas by anadromous fishes, this will be a problematic metric to assess.

Wilson stated that *Inaccessible fish spawning areas by obstruction type* would be a little easier to address, particularly if the focus was on dams and not culverts.

Wilson suggests making both metrics for *Fish Habitat* has Tier I.

Brian stated that he thinks *Inaccessible fish spawning areas by obstruction type* should be a Tier-I metric because it applies to the whole system and there are many other assessments out there with lots of data to easily track the amount of accessible versus inaccessible areas (e.g., river miles or some other metric).

Wilson agreed but again noted that we are talking specifically about dam data here. He suggests talking with NCDMF more about what culvert analyses they are doing,

particularly in the northeast portion of the state (Chowan River Basin). Wilson also noted that although not germane to APNEP, the Cape Fear River Partnership is doing a culvert analysis in the Black River watershed.

Wilson asked if there was a separate MAT for invasive species.

Dean and Tim stated that the indicators associated with CCMP Outcome 2C (invasive species) will be primarily addressed through the Invasive Species Action Team, but if this Aquatic Fauna MAT has further suggestions then APNEP staff will relay that information to the Invasive Species AT.

Wilson asked for a quick review of the next steps for this Aquatic Fauna MAT.

Dean stated that APNEP staff will work with Wilson as team lead, to make sure that the updated list of indicators fully captures all of today's discussion. The list will then be sent back out to the team, along with a Doodle poll to schedule the next webinar for some time in June.

12:18 PM - meeting adjourned.