

TAHOE SCIENCE ADVISORY COUNCIL

NOTES | SEPTEMBER COUNCIL MEETING

Date: Thursday September 17, 2020 Time: 10:00 AM to 1:00 PM Location: Zoom

Council Members: Sudeep Chandra (UNR), Adrian Harpold (UNR), Alan Heyvaert (DRI), Adam Watts (DRI), Geoff Schladow (UCD), Steve Sadro (UCD), Max Moritz (UCSB/DANR), John Melack (UCSB), Pat Manley (PSW), Joshua Wilson (PSW), Ramon Naranjo (USGS), Paul Work (USGS), Jennifer Carr (NDEP), Elizabeth Williamson (CNRA), Jim Lawrence (DCNR)

Robert Larsen (CNRA), Alison Toy (UCD)

Stakeholders: Laura Korman (LWQRCB), Jason Kuchnicki (NDEP), Jack Landy (EPA), Dan Segan (TRPA), Julie Reagan (TRPA)

Guest Presenters: Monica Arienzo (DRI), Jenessa Gjeltma (UCD), Katie Senft (UCD)

10:05 Council work status

1) Clarity Trend Assessment (Paul)

- a. Not a whole lot to report, still in process to responding to comments. One TSAC members, 2 USGS members, 3-4 agency people, and Bob.
- b. Deadline coming up
- c. Target to be done by the end of the month which needs to get back to the internal review process hopefully it will not take too long because they have seen it before.
- d. Ramon thinks because of the substantial edits and revision, the review process should then be quick. They just want to check we addressed the comments, hopefully would not take more than a couple days.
- e. Bob thinks this is useful to know, USGS is committed to using data and making sure it was publicly available and publish a related paper, what is the timeline for that?
- f. Paul needs to pursue releasing data online, done to receive approval to release report. Will work on that next week.
- g. John even with the datasets that are already available, wondering will links will be provided so that users can see all the data sources in the report?
- h. Paul says was not planning to link to every site, but for example used a lot of USGS endless data will provide an endless site and users can pick within the site. Other things will have link likewise.
- i. Jim is wondering interested in this goal between science and management, is there any thought that once the data has been vetted, is this something we need more management agencies to discuss once the science is completed or is this stand along and people can interpret as they see fit.
- j. Paul thinks it might be good to get the news out there so that people can make better use of it.

- k. Alan also thinks it is worth pointing out the upcoming project data analysis and synthesis really builds on this effort, and to continue to develop that data assembly and analysis moving forward, and that is designed to engage management in the process.
 - l. Geoff says at the time of the bi-state meeting the report is still not complete, we were limited at the time, we are discussing preparing a two page document aimed at agencies with the important take home messages. If you think a meeting in conjunction with that would be useful, let us know.
 - m. Jim is not sure if a meeting is necessary or not and recognizes it was not completed yet. We (Lizzy, Secretary Crowfoot and Secretary Crowell) really are looking at strengthening that bridge so that we know land managers and policy makers are getting the info they need and apply it correctly. The two-page document would be good, the more we tighten that bridge it helps science efforts in the basin because we bring in legislators and cabinet members to understand the science is being done and how it is being used.
 - n. Bob agrees with Alan a big push of the data synthesis analysis is to springboard off the summer-winter clarity analysis. Knowing what data is out there, making it available, and having the council regularly monitor and analyze and communicate that information.
 - o. Ramon adds that in the report there is a section of limitations, looking at data sets through our analysis. Discuss data needs where info is lacking and cannot be resolved. In the context of questions asked, there were data gaps that were identified and it is important for agencies to look at those sections and understand data limitations there are based on what was asked of us.
- 2) Upland Ecosystem Science to Action
- a. Adrian says Pat did all the work
 - b. Pat says it was a team effort. Hoping to have final draft for TSAC review today, but was unable to. Adrian did his final edits and Pat is hoping to get that done and then to TSAC within a week, two weeks at the most. Fires and things have made it impossible to move it along, appreciate everyone's patience.
 - c. Bob recaps, final review at the end of the month and then by Mid-October for TSAC edits to get in.
 - d. Pat is unsure of what the process is, have a verbal check-in, can we do it by email or do we need to wait to we reconvene?
 - e. Bob thinks there has been good discussion, good presentation at the last meeting, and thinks the document could be finalized by email.
 - f. Ramon thinks typically final written documents are given time for other to chime in and review, this is a representation of the council so it is important to provide opportunity to have everyone weigh in. Document seems mostly polished and everything is there to move it to completion.
 - g. Geoff, would there be a specific advantage or disadvantage to one or the other. If we all say it's great, it's not going to happen the following day. When this is all signed off on, what happens next? Do we go forward with two separate plans (aquatic and uplands) that may have gaps and overlap between them or do we reconcile them into one plan.
 - h. Bob agrees, what it takes to finalize this plan first and then yes, do we combine?
 - i. Pat there's no new information that will show up in the next couple of days, thinks not having to wait until the next meeting would expedite to plans for implantation and

moving on that. On task one, we thought there were important valuable investments, so what funds can be put towards that work. That would be the next great step or conversation, plan is approved, we identified priorities the funding and how we allocate funding. Would love to be at that point next meeting. Next question is how are we moving on to a future more robust agenda for uplands and interrelationship for the uplands and the lake. That would play out over the entire year I would think.

- j. Adrian likes the plan that Pat has laid out.
 - k. Bob agrees in November meeting, have discussion of tasks and plan to pursue those tasks. It would be great to decide priorities and next steps including marrying plans and having broader conversation.
- 3) Clarity Model Assessment
- a. John this group: Geoff, Sudeep, Ramon, and John. Listed characteristics of current modeling effort, pros and cons. Paul has offered some feedback. As a committee we need to get together and see where we are. Figure what needs to be done or how to solicit input to do substantive work on the clarity model. We have documents, comment, text, and perspective but have not come to consensus to finalize what we are going to say.
 - b. Geoff says by not coming to a consensus it doesn't mean we aren't disagreeing but we just need to meet screen to screen.
 - c. Ramon is wondering what assessment means? Looking at the actual code? Or looking at how the predications made in last couple publications based on management strategies if they are accurate to today's clarity? Are you looking at a numerical code resolving processes or context at how well model was used predicted from the last previous uses?
 - d. John, not looking at code, that is the next step. If you look at the current model, XYZ processes that are modeled and looking at the state of the science like physical, particle, optical, ecological, all models. In process of pinpointing a process or conceptual level where have modeling and empirical results, resulted in potential improvements and how we can have do better models or have better empirical bases for the models. But we haven't gone into detail of how has it predicted XYZ in the last five years that wasn't our brief. It's been more does the model need more ecological dimensionality, a better physical template to be working with? The complexity is that sometimes the lack of data sets are a problem, we need these data to do a better job, it's not a modeling problem it's a data problem. There is discussion in text that says this paper was written 10 years ago draw comparison to existing data, but did not look at the last few years at whether or not the model works, that's a different question.
 - e. Bob says revisit the 2019 work plan part of it was to revisit clarity model task was broad and undefined, then thought it would be good to refine the conversation and figure out the next steps. A good question for management what do they need, what are the priorities and next step in regards to understanding clarity in Lake Tahoe?
 - f. John says part of our activities we as a small group need to meet with agency members, we have several steps to take still. Hope by November meeting we will have something to present.
 - g. Geoff thinks that possible and good aim. But did not think he was going where he is going. Seems to be questions coming from the two secretaries about clarity. It is more

than just clarity. So in looking at this clarity model which could embrace a lot of other parameter, is your opinion, that we should be looking at clarity in the broader sense rather than just a goal aim of a specific number of clarity?

- h. Jim doesn't feel confident giving a specific answer, a lot of it is there. We get to the annual summit because historically a lot of the research centers around clarity, but Brad is looking for more information that discusses the overall health of the basin. Is there a desire to take that clarity work and leverage it to tell the overall health story? Don't know if it's possible. But potentially continue to tell the story of clarity but then also how it feeds into the overall health.
- i. Geoff thinks the models we are talking about can do a range of things to address the clarity question, but it's having to describe lots of other things, a little wary and don't want to say this is what we have to do for clarity and then disappoint by saying there's more to it than clarity again. Something to discuss at next in person meeting.
- j. Jim sounds right, what are the next steps to bring management to the table so they can fully understand the results and integrate. Moving forward it is part of developing a capacity of a communication strategy. The more we get better communicating all the science, how they link together, how they are independent, tied to other things, if we can get there and articulate to decision makers, the it lowers risk, it's not disappointing if we can communicate the bigger picture in a greater strategy sense.
- k. Bob says demonstrate how clarity is a metric of lake health and how it is responsive to climate change and to tell that story and tell how it is a good indicator of how the system responds to it. Rather than clarity for clarity sake, not just aesthetic, but a broader indicator of system health and things happening in the watershed. Couple different angles on the discussion.
- l. John says this is a lake model, but what the current system is not doing is looking at the watershed models. That is an aside. That is a decision point that we made. The current clarity model has inputs from the watershed and it has some models that are part of that input but we have not dug into those as much. There is an issue of bounding the effort. There is a question of why we aren't doing that, and because of the way this work order was structured, we were trying to keep it in bounds, but open to discussing that issue. Do not want people to think we are doing something that we are not.
- m. Geoff says it is an example of a good linkage, of uplands and aquatic where the water meets the land.
- n. Adrian says that is what the upland team is planning to do, need more time and money.
- o. John says in our report we can acknowledge what Adrian just said, we are not ignoring it, it is part of the overall plan. Obviously, we know it is relevant.
- p. Sudeep confirms that thinks we have to have the conversation about those linkages the broad evaluation upland activities and models whether or not it can inform clarity. If we are trying to predict or trying to explain clarity. What are the important inputs from a watershed or atmospheric side? That would allow us to understand clarity responses. Do think, some assemblance of them in the report or highlighting the need to address in the next phase is important.
- q. Bob says its good to see these conversations overlap and link, with respect to what Geoff says as it was a small order, get to the completion. In terms of the state seat, what

is the best investment of resources in terms of how the system is functioning, this will be a valuable part of the discussion.

- r. Ramon asks if the model will be made available to everyone? Are the data sets used to drive the model available?
 - s. Geoff says both are in public domain, data too, it just really has not been run since 2011 using data preceding 2011. It is all there, we did not plan on creating a Github site or anything anything with data but if it's wanted or needed, we are happy to do so. We are not evaluating the model strictly speaking, but what the model is purported to model and the basis upon it is doing it. Whether is sufficient and the whole approach type of modeling being done for one element or the other is the correct approach. It's an ugly model that's been modified slowly over the time, maybe 10,000 lines of code when it really needs 1500.
 - t. Sudeep agrees.
 - u. John says that is the point of this, one could say that going forward if you want a publicly usable model, one step would be to redo the coding. There's money on the table to do that job. This is a scoping job for the next substantive work. We aren't doing that, we are proposing priorities that we want people to respond to.
- 4) Peer-review committee leading peer review of *Mysis* shrimp project at the lake. Adrian says peer-review perspective, still figuring out how to do this so feedback is appreciated. Classic review to allow reviewer to work individually and then come back to develop a report. Tasked reviewer with full report last review. Makes more sense for Adrian to coalesce comments into one document. Everyone that wanted to had the ability to contribute names, about seven names, will not mention reviewers at this time, but it will come up later, a big group. Mid-October is the goal.
- 5) Data Synthesis and Analysis
- a. Bob says we have touched on this, but this will be the next big work.
 - b. Alan says it was a near-term priority in science to action plan. Builds on what we already did for the winter summer clarity assessment. Primarily focused on mid lake clarity, support collaborative on-going data assembly and analysis. Provide data, analysis and projections as we go forward. Has significant agency tie-in. There will also be a lot of background work happening on a regular basis clean and consistent for analysis. Work order was sent out, Ramon, Alan, Geoff, Shohei, and John Melack, all interested and participating on different levels. Some topics need more background work that will be happen on the UC Davis side as most data is coming from their platforms. Pull all this together for an annual workshop in March or April, under a TSAC umbrella and agency members at high level, what we have, data gaps, uncertainties, and provide projections. This is focused on the data, what does it tell us, how to use advanced statistical models to make predictions in the long-term and the confidence of the interpretation of the data. Project is going to start up, need meeting in the next month to organize how to orchestrate this and set us up for success. One of the deliverables is a process structure memorandum, how did we... on-going analysis and use this as a model for other projects going forward. This is something we will tackle right away, how we will structure this approach. Work order in October so we can get started right away.

- c. John has a procedural question, has not seen a work order.
- d. Alan clarified a draft work order, to get people to close the loop on final work order.
- e. Bob says the work order process has been loose to some degree and would be interested in tightening it up. Has worked with John and Alan and yes there is no final work order yet, but would like to circulate latest draft to council and people can engage based on that. Welcome feedback to work order process, to date what we try to do is circulate a draftm elicit interested, and the issue work order. Wants work order to be reflective of what we want to accomplish and set up a clear scope specific to getting work done.
- f. Alan thinks it will be important to get the subcommittee together in the next few weeks refine what we are going to do, resources we have to accomplish this in advance of that Bob will reissue latest work order draft.
- g. John says we are still in the stage of development is one point, people can still weigh in is one point. When you do a work order like this, who could participate, like who can we distribute to? For example if it is data based development, maybe no expert on the council, then the actual work should be done by someone else and we have done that to some extent. There are different kinds work order, some clearly in our scope, but some may benefit from being more expansive.
- h. Bob says he has struggled with this, he can envision where council members lead the project, but if there is a need for external support we can allocate resources appropriately. With projects with clear nexus with our expertise and council members lead and identify external needs. Something the project team can identify and plan out what it looks like. The work order itself not for all work to be done by council members, but to leverage expertise in your institutions to get the work done. The council itself cannot carry the workload of science in the basin, we coordinate and show how it supports management. The idea for this one is get the group together and figure out there is a need and budget accordingly. Welcome ideas.
- i. Geoff, did not believe that this work order was aimed at developing a data base thought it was more directed at using what data we have, climatic projects to see what they are and how that might affect lake, clarity, and hydrology, not making new data. Can see bringing a meteorologist to this group, that the idea of a database specialist seems unnecessary
- j. Bob things We are trying to bring data together. we need a better way to manage and access data, it was just an example. No predetermined set. We are accessing data and setting up process to access data on a regular basis, what is the cleanest way to do that? What does the council need to do to meet this larger vision of integrating information and we will need to access that information.
- k. Ramon thought the data was evaluating until we are in the workshop to finalize what is impacting clarity to date and this wasn't intended to be a forecast or predictive analysis. Thought we moved from that conversation. What is this work order supposed to do?
- l. Alan it's really to keep us updated on lake conditions. There is some predictive aspect. Some of variables we find that drive summer clarity and beginning of winter clarity manifest in spring, depending on the type of water year we have. The objective is to look forward a bit to anticipate what we are likely to see and to refine understanding

the statistical causal linkages between these elements driving lake conditions. And tightening interactions with agencies representatives so they better understand what we are looking at and our interpretations as we go along rather than once a year right before the summit, so they aren't scrambling. Keeps the whole process moving throughout the year, in a integrative collaborative way. Looking at the data will help us better understand what we are missing, the gaps, we start looking at the other contributing factors. We are forecasting.

- m. Adrian doesn't think we have the skills to forecast the weather.
 - n. Alan in the sense of predictions or forecasts, statistical models will predict a response to current conditions. It is semantic.
 - o. Adrian says if you put out forecasts and it is bad, you lose you stakeholders.
 - p. Alan says it doesn't mean we won't go through the process, but address in a more on-going basis what's going on in the lake and what we predict will happen next.
- 6) Sustainable Recreation
- a. Alan says funded by SNPLMA secondary funds, collectively be working with agencies to get those funds into a process that will allow for their availability.
 - b. So far stuck at LTBMU, latest is that they will submit those in October, so maybe by November and December funds will be available.
 - c. Will develop work orders and discuss in detail.
- 7) Landscape-scale Treatment Impacts
- a. Geoff has same report as Alan
 - b. Bob says need to work to get the ball rolling. Can have a discussion later to where we are going.

11:05 State updates

- 1) Jim reports that he did talk to Lizzy, regarding the state update, at the conclusion of the executive meeting, Crowfoot and Crowell thought it was a good meeting a drafted a press release, realistic that not press will pick up footage about meeting. Primarily what we did and it was successful. Both states are looking for the opportunities to elevate TSAC in a public facing way, leave it up to you how to do that. A communication strategy, more TSAC workshops, etc. Keep beating the drum on messaging, between science and action. Jim add that the state resources have sponsored a bi-state vehicle consultation, and VMT will be essential to planning moving forward. On the Nevada side, last meeting had work session they vote on what bills to sponsor, lots of time in form of resolutions, they did vote for a couple of resolutions and one of them was to strengthen the research planning in the basin from a legislative perspective. Wording isn't worked out yet, resolution for Nevada institutions ... funding in the basin. The thinking that this is NV, weigh in on language so that eventually efforts are fully vetted and coordinated with California. Very early voted in on, next step is to draft language before it becomes public.
- 2) Bob says Crowfoot hosts a secretary speaker series, Lizzy wants to do one for TSAC, shooting for March next year. Think about topics and how to structure discussion. Structure around topics of aquatic and forest and the S2A framework on both sides. Welcome any thoughts.
- a. Pat thinks it is a great idea and attended some of those speaker series. They are impressive and get a lot of exposure for us and can help grow our impacts in the basin.

Really like as an objective for how we portray our work, finalized plan and such. March is a great target date.

- b. Bob says he is glad that she is volunteering to lead this effort. Looking for people to engage.
- c. Pat says she is happy to help.
- d. Jim thinks that elevating TSAC with the speaker series is great it will take some work. Every time legislation starts February 1st, who knows what it will look like next year, but every time it is in session there are special days like mental health day, sustainability day, etc. it would be great if the speaker series might lend itself to a display board would love to see science day would be great. It might be an opportunity to elevate in the halls of the Nevada legislation.

11:20 Bi-State Executive Committee Meeting debrief (Bob, all)

- 1) Thank you to Paul and Pat for leading conversations on upland ecosystem and... both secretaries are engaged and interested. That interest and engagement changes regularly, continue to use Council to serve as a linkage between science and management in the basin. Thought it was a good meeting with a lot of productive discussion.
- 2) Jim thought it was great, Brad thought so too. Struggle for him sometimes with a lot on his plate, an annual check-in is not enough, so much work to get everything in order, but maybe one meeting in the interim to elevate and get into greater discussion at the main meeting. Do not know how to do it, but it would be good.
- 3) Bob says convening the executive committee for a mid-year check-in, doesn't need to be a 2 hour meeting, just highlighting things we talk on a regular basis, status of projects and where the council is going to help bridge the gap. That once a year check-in is not enough. More of an opportunity for regular dialogue.
- 4) Geoff says the same goes for research institutes and agencies, Alan and Geoff has been in discussion with reps to have conversations for example of indirect cost rates, something that Wade and Brad could not care less about. Other members of TSAC, it is nice to have a problem like this, 2-3 hours once a year is not enough for them or us, let us solve the problem and go from there.
- 5) Pat thinks meeting twice a year would be good. If we met more than once we could get more clarity and understanding. The difference of perception between role of science at Lake Tahoe and how important it was to understand its pieces. The more we understand more of the driver and how we respond to them, makes us more successful in preserving the integrity of the lake. Flipside, was with upland, can we get on with it? How can we get science to move quickly? Presents a challenge for TSAC and science, we do not have time for science, we just need to get on with it. Something to reflect on and understand how we can address these concerns in the basin. Put some thought into how to portray our research, need to reduce uncertainty and the need to take risk. How do we manage the uncertainty in the process of taking risks in order to get things do.
- 6) Adrian has heard a lot of things in terms of long-term planning. There is so much going on with on-going, but we are so forward thinking that we need to do both.
- 7) Bob good observations spills into conversation where does the council go from here, how can the council engage and synthesize and communicate of what is going on now while setting

trajectory for the future. This afternoon's discussion will be how we are committed to bringing current research to council, setting aside time to hear things that are going on and get at this to some degree. Using lake as a starting place, but it really is how can council regularly review and synthesize information and communicate that. It's a little daunting to think that we will cover everything and share that with management, but how to keep this communication going is part of the discussion

- 8) Pat one way to think of it is the investments to protect the lake, what can we do, you cannot do too much, other maybe social economic limitations. Two tailed risk abatement with uplands, you can do too much and you can do too little. Both ends of spectrum have implications for aquatic and uplands. This is where I feel like we can define the problem that is important to discuss where we put our resources it not necessarily all about protecting, reducing risks it is on both ends of the spectrum. If the exec meeting if response is mostly on the side that we are not doing enough, how can we do more, and how can we do more.

11:45 Council activities (Bob, all)

- 1) Circulated document of status of various project, put together opportunities in the coming year, a separate task from seasonal analysis, put together a communication piece to discuss funding and discuss importance of clarity metric for lake. Public facing piece of what the council is doing in respect to lake. These types of documents is one topic, the other is now that we have two plans with respect to lake and upland, what are the next step in terms of implementation and putting together a broader vision, where should the council go in the coming year.
- 2) Geoff, on the second item, the combined S2A plan, the hardest part is prioritizing. We have 10 things we want to do with various times lines and price tag, which one do we do. It requires a discussion with agencies too. What we consider a science priority may not be important to management. We need to allot specific time for that, bear that in mind, carve out time and a process. Having a plan but no way of implementing because there is not priority. One thing that was not mentioned, there are some big government players that are operating independently oblivious to TSAC, make them aware of what we are doing and what we could doing. Such as CalTrans and NDOT, agencies with huge budgets and impacts on both land and water. LTBMU as well, while aware of us, does whatever. How do we reach out to them? People who work in government are in the best position to approach this subject.
- 3) Adrian agrees we have a lot of science priorities when we start combining the plans do we need outside perspective? That is something with peer-review to bring that in.
- 4) Geoff doesn't think we need outside science perspective, we are pretty broad as it is. In the end the agencies are funding this and if it has something we are prioritizing that has no interest to them, hard for them to make a case to back it in expense of something else.
- 5) Adrian says do we just need a group of management to discuss.
- 6) Bob thinks first work order is to establish this committee and initiate the dialogue what are the priorities and where to we go from here. Read these two plans and then come to the table for discussion. Can't jump into process without conversation, make some time for that.
- 7) Geoff thinks we need to be part way in the process, first we need our priorities and that is when we need the management reality check that may change our priorities. Maybe our priorities will make them rethink.

- 8) Ramon when these work orders are being developed is it possible to share with agencies not participating to try and get them more engaged and perhaps that engagement might get more participation and insight.
- 9) Bob this goes back to work order process, states have pot of money and a broad idea. A broader conversation to have open ended conversation as to what the work orders look like.
- 10) Jennifer as management agencies, while another external brainstorming or check-in is an interesting idea, to do offline, wondering if the agencies involved need to rethink how to better leverage position on the council to do some of that communication and then get back to group. That is the benefit of having agencies with seats as members of the council.
- 11) Dan in regard to the VMT project, bringing to broader stakeholder group, have a couple of meetings, bring council work to better analyze VMT data of travel patterns in the basin. Iterative process with work in the Council and then getting larger buy-in, it is being brought to life in that forum.
- 12) Jack second what is being said and says that the TIE steering community might be a good platform to initiate that conversation.
- 13) Laura echoes Jack and Bob's thoughts, as we move forward would be good to involve them in conversation.
- 14) Jim says there is a lot to unpack in the conversation, how do we prioritize. Don't know if it's best to combine or not. Combining has strategic challenges, when you're looking for funding, it gets too large to wrap your head around, smaller pieces might be easier to digest. Has to be meaningful prioritization. Does not know if we can get every single decision maker at the table. Our role is the agency folks to make sure integration happening at the appropriate level, for something as large as combining the two science to action plans there should probably be two things. One is management responsibility to bring the right folks for review and then the other is a forum for TSAC to hold, maybe at the same time of the meeting to get everyone up to speed and then get input.
- 15) Bob says it definitely highlights something that came out of the executive meeting, the need to tighten up the relationship between resource agencies and the council, more discussion to come, will work on co-chairs agendaizing to allow for further conversation. Bob will reach out with additional thoughts.

12:00 Microplastics at Lake Tahoe

Presentations Dr. Monica Arienzo (DRI) Dr. Jenessa Gjeltrema (UCD) Katie Senft (UCD)

DRI:

- Using basin-scale approach
 - Snowpack
 - Atmospheric deposition
 - Run off
 - Residential
 - Bioaccumulation
 - Stormwater
 - Sediment accumulation
 - Macro versus micro

- Sample and filter water in the field for microplastics using a pump
- Filter on locations with still water and in places where boat access is limited
- Greater approach and repeatability
- In sample/analysis phase
- Present data at Kings beach, Nevada beach, Lower Truckee and finding thin, long particles

UCD

- Macroparticles versus microplastic
- Trawling with manta ray
- Water samples at depths throughout water column, bottom sediment samples, beach samples and municipal water samples
- Raman spectroscopy to confirm presence of plastic